A

MILLION OF FACTS,

AND

CORRECT DATA,

IN THE

ENTIRE CIRCLE OF THE SCIENCES,

AND ON ALL SUBJECTS OF

SPECULATION AND PRACTICE;

ADAPTED TO

THE CLOSET AND THE ACTIVE WORLD.

BY SIR RICHARD PHILLIPS.

The man who writes, speaks, or meditates, without being well-stocked with FACTS, as land-marks to his understanding, is like a mariner who sails along a treacherous coast without a pilot, or one who adventures in the wide ocean, without either a rudder or compass.—LORD BACON.

Facts are to the mind the same thing as food to the body. On the due digestion of facts, depend the strength and wisdom of the one, just as vigour and health depend on the other. The wisest in council, the ablest in debate, and the most agreeable companion in the commerce of human life, is that man who has assimilated to his understanding the greatest number of FACTS.—BURKE.

A NEW EDITION, ENLARGED.

London:
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AND TO BE HAD OF ALL BOOKSELLERS.

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PREFACE

TO THE NEW EDITION.

The rapid sale within a few months of a large impression of the first edition of this work, and the very liberal applause which has been bestowed on the plan, have stimulated the Author to revise and improve every part,—to introduce several new and important chapters,—and to re-arrange and systematize the whole.

If the work might at the first have been honestly called a Million of Facts, it may now, with strict propriety, be called a Million and a Half; for the additions have been immense, while repetitions have been avoided, and a more perspicacious display and more analogous juxtaposition have been preserved.

Such a work, from its nature, can, however, be only an approximation towards perfection, since facts, or results, are so numerous, that even a billion, if desirable, would not include all. The most, therefore, that can be expected is, a selection of the more important and interesting, to serve as data in reasoning, action, or contemplation.

In his improvements and enlargements, the Author has, of course, made use of the latest and best authorities, in which his opportunities have been considerable. In many cases of difference, he has often, with much solicitude, endeavoured to harmonize discrepancies, and, in numerous instances, his readers will find, in a line or a figure, the results of very operose calculations.

Many persons might have made a better book, in conformity with the plan, and others a different book; but no one could have wrought with more zeal to disseminate truth on every subject, and to produce a volume, whose utility should be felt and acknowledged by all who consult it.

The variety of subjects, and the complication of details relative to some of them, unavoidably expose the Author to criticism from those who have devoted their lives to single subjects. He may often be found in error when placed before such accurate critics, yet he hopes he will appear, in most cases, to have seized on the prominent points, and to have introduced tables, figures, quantities, and ratios, whose exhibition, in this form, will, at least, be found convenient.

By students in general, and literary men in every pursuit, —by persons residing at a distance from large libraries,—by those who wish to avoid the labour of research and comparison,—by practical men,—by politicians,—and even by the readers of newspapers and journals,—by residents in distant climes, and by travellers, to whom large books are an incumbrance,—by loungers at watering-places, and by summer-residents at country-seats, the volume will, he trusts, be deemed a valuable acquisition. In a word, he conceives that, even in the largest libraries, in colleges, schools, and universities, regarded only as a portable index of ready reference, it will extort approbation.

At the same time, the Author claims credit only for the plan; the facts and materials being necessarily derived from thousands of laborious and ingenious men, in every past as

well as in this generation. The degree of tact in selecting, discriminating, and combining, is not a proper subject for his commentary, but rather of respectful appeal to the generous consideration of his candid and intelligent readers, to whose award he is bound to submit.

As the novelty of the plan, the variety of subjects, and the multiplicity of figures crowded into so small a compass were without example in the experience of printers; so the first edition was unavoidably disfigured by many typographical errors. For these, the Author cannot sufficiently apologize; but he alludes to the circumstance for the purpose of acknowledging the kind indulgence of the public, having from no quarter received even a murmur of disapprobation, but, on the contrary, many encomiums from literary and scientific persons, whose opinion is at once a reward and distinction.

A larger edition is now printed; but as the nature of the work must, in due time, render its distribution co-extensive with books and readers, and other and many editions may be reasonably expected, the Author will feel grateful to any person who will condescend to transmit corrections or improvements, addressed to the care of the publishers. It is his ambition to render it a standard book of reference, as far as its space admits; and, at the same time, it will be his care to limit its size and price, so as not to deprive it of its claims to general reception.

Some partial friends have recommended him to print an edition in larger type, in octavo; but as this could not be done at less than twice the present price, he forbears, unless

he were to receive the names of a few hundred persons who were willing to patronize such an edition.

In this form he is enabled to present to the world above a hundred thousand facts, at the low price of one shilling, or nearly ten thousand for a penny. Much has been vaunted about cheap publications, and penny magazines have been the wonder of the day; yet, after all, the present is the most memorable example—nothing else in literature or in printing can compete with NINE THOUSAND FACTS FOR A PENNY.

FACTS, too, have special value: they are the data of all just reasoning, and the primary elements of all real knowledge. The wisest man is he who possesses the greatest store of Facts within the command of his understanding. A book, therefore, which assembles Facts from all their scattered sources, may be considered as a useful and important auxiliary of Wisdom. It lays claim to be the companion of ALL who earnestly seek truth at the fountain-head; of ALL who think for themselves, or who desire to be thought to do so; and of ALL who desire to correct errors in themselves or in others.

The pretensions of the Editor are a prolonged and uninterrupted intercourse with men and books. He has for forty-three years been occupied as literary conductor of various public journals of reputation; he has superintended the printing of some hundred books, in every branch of human pursuits; and he has been intimately mingled with men celebrated for their attainments in each of them.

The INDEX is long and copious; but, in such a work, it is so important a feature, that, contrary to usage, it has been placed in front of the volume. Generic or leading facts have double references, and as kindred subjects are treated of in the same pages, it is conceived that every probable enquiry may be always satisfied with readiness and certainty.

Encouraged by the liberal patronage bestowed on this work, and disposed to avail himself of a large stock of experience in the useful arts which distinguish his age and country, the same Author is preparing for early publication, a DICTIONARY OF THE ARTS OF LIFE.

It will be printed in the size and type of the present volume, and be sold at the same price.

It will exhibit all that Chemistry, Pharmacy, Metallurgy, the Mechanic, and the Manufacturing Arts in every variety of manipulations, have developed, since the last general works on the same subjects have appeared.

The Author will also avail himself of much original information, which he collected during a late tour through the Cotton, Worsted, Silk, Lace, Pottery, and Hardware districts of the kingdom; and, unlike books in general, this Dictionary will, in its way, be at once an assemblage of facts and practice.

It is already in the Press, and will appear in the course of the Spring of 1833.

GENERAL CONTENTS.

For particular Subjects, see the Index.

ERRATA.

Col.	6	line	14, *for* pearl, *read* pecul.
—	12	—	15 from bottom, *for* P. A., *read* P. M.
—	14	—	20 from bottom, *for* Maraham, *read* Maranham.
—	22	—	4 from bottom, *for* Dioclesian, *read* Diocletian.
—	24	—	36, *for* Cæser, *read* Cæsar.
—	25	—	29 from bottom, *for* Dioclesian, *read* Diocletian.
—	30	—	20, *for* Fontainebleau, *read* Fontainbleau.
—	31	—	4 from bottom, *for* Macculloch's, *read* M'Adam's.
—	—	—	10 from bottom, *for* Anatomic, *read* Atomic.
—	39	—	3, *for* tael, *read* tall.
—	45	—	12, *for* aboissæ, *read* acscissæ.
—	51	—	14 and 15 from bottom, *for* Neper's, *read* Napier's.
—	58	—	33, *for* serpentous, *read* serpentine.
—	106	—	28, *for* Pynacre, *read* Greenacre.
—	164	—	1, *for* misosa, *read* mimosa.
—	170	—	6, *for* flower, *read* flour.
—	186	—	25, *for* Gneiss-wacke, *read* Granwacke:
—	265	—	23 from bottom, *for* numerous volcanous, *read* numerous volcanoes, &c.
—	328	—	31, *for* Circle $^{15\cdot708}$; *read* Circle $^{1\cdot5709}$.
—	—	—	36, *for* $\frac{1}{3\cdot1416}$, *read* $\frac{2}{3\cdot1416}$
—	334	—	6 from bottom, *read* inequality of the distribution.
—	335	—	35, *read* greatest equation of centre.
—	336	—	22, *for* Le Lande's, *read* Lalande.
—	—	—	*read* 59″.5
—	337	—	*read* 43″.2 and 36″ or 35″ and 32″
—	338	—	16 from bottom, *for* up *read* upon.
—	340	—	17 from bottom, *for* Hivelius, *read* Hevelius.
—	342	—	*read* 46·985 and 4607600.
—	—	—	32 from bottom, *dele* the words *Curious Harmonies*, or read them in continuation as an observation.
—	343	—	19 from bottom, *for* allusions, *read* illusions.
—	348	—	*read* on to 351, being divided for the even table.
—	351	—	11 from bottom, *for* azemuth, *read* azimuth.
—	—	—	5 from bottom, *for* Dorpart, *read* Dorpat.
—	352	—	18 from bottom, *for* Hallus 8, *read* Halley 8.
—	354	—	*transpose* the ″ ′ at the head of the fourth column.
—	357	—	10, *read* γ Draconis, and 3 lines lower, *read* 5 hrs. 45 min. 53·3 sec.; and 3 lines lower, α Herculis 6 S. and 5 hrs. 4 min. 8·6 sec. and 17 hrs. 6 min. 54 sec.
—	—	—	34, *for* ♈, Draconis, *read* γ Draconis.
—	—	—	7 from bottom, *for* eclipses, *read* examples.
—	—	—	28 and 34 *for* Betelgeaux, *read* Betelgeux.
—	359	—	24 from bottom, *for* of, *read* or.
—	364	—	23 from bottom, *for* the inunions, *read* their unions.
—	—	—	19 from bottom, *for* columbian, *read* columbrium.
—	367	—	30 from bottom, *for* structure, *read* stricture.
—	368	—	13, *for* Italy is, *read* Italy has.
—	393	—	34, *for* soap, *read* soda.
—	396	—	9, *for* CALORIFIC, *read* CALORIC.
—	408	—	25 from bottom, *for* melts, *read* freezes.
—	413	—	6, *for* Ho, *read* Otho.
—	418	—	19 from bottom, *for* rellative, *read* relative.
—	426	—	11 from bottom, *for* Gynnotus, *read* Gymnotus.
—	483	—	25, *for* stuff, *read* staff.
—	501	—	last, *for* 50,000*l.*, *read* 5000*l.*
—	602	—	2 and 4 from bottom, interchange the words *steadiness* and *amount*.
—	697	—	30 from bottom, *dele* *l.* after 2,300,000*l.*
—	795	—	16 from bottom, *for* volitition, *read* volition.
—	816	—	15, *for* Rmoan, *read* Roman.

*** *For some varieties and anomalies in the orthography of names, and some errors not affecting the sense, the indulgence of readers is solicited.*

INDEX.

A MILLION, &c.

A
MILLION OF FACTS,
OR,
UNIVERSAL COMMON-PLACE BOOK.

MEASURES OF CAPACITY.

CAPACITY is length, breadth, and thickness, estimated by known measures, or compared by other known quantities: thus there are $12 \times 12 \times 12 = 1728$ cubic inches in a cubic foot; and $3 \times 3 \times 3 = 27$ cubic feet in a cubic yard.

The *Imperial gallon* is 277.274 cubic inches. It contains 10 lbs. avoirdupois of distilled water, weighed in air, at 62°, with the barometer at 30 inches.

Till the Act of 1825, we had three several gallons. The *wine*, of 231 cubic inches, holding 8 lbs. 5 oz. $6\frac{1}{4}$ dr. of pure water—the *corn*, of 268.8, holding 9 lbs. 10 oz. $1\frac{3}{4}$ dr.—and the *ale*, of 282, holding 10 lbs. 2 oz. $11\frac{1}{4}$ dr.—and now instead of these, one uniform *Imperial* gallon, of 10 lbs. of pure water and 277.274 cubic inches.

One English wine gallon is equal to 0.8331107 Imperial gallon.

One ale gallon = 1 017045 Imperial.
One corn gallon = 0.96943 Imperial.

One Imp. gallon = 1.20012 wine gall.
One Imp. gallon = 0.933241 ale gall.
One Imp. gallon = 1.03152 corn gall.

Serving as multiples which-ever of the 3 are given.

The Imperial corn hushel of 2218.192 cubic inches, is to the Winchester of 2150.42, as 32 to 31.

The imperial wine measure is to the old measure as 6 to 5; 5 imperial gallons being 6 wine gallons and $\frac{1}{4500}$th over.

The new and old ale measures are as 60 to 59.

To convert old or Winchester corn measure into new, multiply by .96943, or $\frac{31}{32}$, for wine, by .83311 or $\frac{5}{6}$; for ale by 1 01704 or $\frac{60}{59}$.

To convert new imperial measure into Winchester, multiply by 1.0315157 or $\frac{32}{31}$. New wine measure into old, multiply by 1.20012 or $\frac{6}{5}$; and new ale measure into old, multiply by 0.98324 or $\frac{59}{60}$.

The Imperial dry bushel is $8 \times 277.274 = 2218.192$ cubic inches; the peck 554.548, gallon 277.274, quart 69 3185, pint 34.659, and gill 8.665. The bushel is 8 inches deep, and 18·8 wide inside, or $19\frac{1}{2}$ outside.

The Imperial measure for heaped goods contains 80 lbs. avoirdupois of distilled water, and is $19\frac{1}{2}$ inches from outside to outside at the bottom; the heap to be in a cone at least six inches high from the outside.

Coals are sold by the ton, and delivered in ten sacks to the ton, each weighing 224 lbs. nett. The chaldron was 28 cwt.; hence, at the same rate, the price of the ton to that of the chaldron ought to be as 5 to 7.

1000 ounces of rain water are equal to 6.25 gallons wine measure, or nearly a cubic foot.

Twelve wine gallons of distilled water weigh 100 lbs. avoirdupois.

Nineteen cubic inches of distilled water, at 50°, weigh 10 oz. troy.

One gallon weighs 8.333 lbs.—one pint 1.0416 lbs., and 1 lb. is 0 96 of a pint of distilled water.

Heaped measure, per bushel, is $2815\frac{1}{2}$ cubic inches clear.

The old standard bushel at Guildhall contained 2145.6 cubic inches of water, weighing 1131 oz. 14 dwts.

The Winchester bushel was $18\frac{1}{2}$ inches diameter and 8 inches deep, containing 2150.42 cubic inches.

A tun is 2 pipes, 4 hogsheads, 3 puncheons, 8 barrels, or 252 gallons. A pipe of port is 138 gallons; of Lisbon 140; Madeira 110; and Sherry 120. The hogshead of Claret is 57 gallons, and the aum of Hock 36 gallons; Teneriffe 120, and Cape 20.

A tun of beer is 2 butts, and each butt 2 hogsheads of 54 gallons. 2 pints 1 quart, 4 quarts 1 gallon, 9 gallons 1 firkin, 2 firkins 1 kilderkin, and 2 kilderkins 1 barrel of 36 gallons.

In dry measure 2 gallons 1 peck,

4 pecks 1 boshel, and 8 bushels 1 quarter.

A boshel of wheat is 60 lbs., rye 53, barley 47, oats 88, peas 64, beans 63, clover seed 68, rape 48 lbs.

A qnarter of corn is the fourth of a ton, and eight bushels, or two sacks.

A strike is four pecks or 2 bushels.

7 lbs. avoirdupois is a gallon of flour.

A coomb is 4 bushels, a load is 40 bushels or 5 quarters.

At 70° the specific gravity of water is 0.99913; at 38° is 1.00113; at 54° is 1.00064, and at 62° 1.0000. The difference between 62° and 39° in a gallon of 277.274 inches, is one-third of a cubic inch.

A last is a commercial measure, of twelve barrels of soap, ashes, herrings, &c.; ten quarters of corn, or two cart loads; twenty-four barrels of gunpowder; twelve sacks of wool; and 1700 lbs. of flax or feathers.

A load of earth is a cubic yard. A cord of wood is 128 cubit feet.

A ton of a ship is 42 cubic feet, or 3.476 feet each way.

The Imperial bushel is equal to 38.7475 French litres.

There are 5452670000 cubical yards in a cubic mile.

A Scotch pint is four English pints.

A Scotch pint is 105 cubic inches, and a wheat farlot 21½ Scotch pints.

The Scotch quart 206.8 cubic inches.

A tub of butter is 84 lbs. and a firkin 56 lbs.

A Scotch boll is an English sack.

A soldier's canteen contains three pints.

The Imperial gallon is 4.843452 French litres.

The French standard metre cobed gives measures of capacity, and those of weight are deduced from the weight of pure water in a measure of capacity.

The elements of the French system, uniting the whole at one view—

Metre . . .	39.37079	Eng. inches
Gramme . .	15.434	troy grains
Are	3 955	Eng. perches
Stere . . .	35.3171	cub. Eng. feet
Litre . . .	61.02803	cub. Eng. inch.

These relations enable any person to compare any quantities by simple division or multiplication.

Wood, the fuel of France, is sold by the corde of 576 square feet; and 80 square cordes make it what is called a journal.

The Dutch aum is 41 wine gallons.

A Roman quadrantal was a cube containing 80 lbs. of water, or 48 sextaries and 8 congii. A gower was 7 pints.

The *Ephah* was the sixth part, or 1747.7 cubic ioches, nearly an English cubic foot.

WEIGHTS.

Weight is the tendency or force with which bodies of various density and equal bulk tend to fall to the earth.

The standard of weights is the cubic inch of distilled water, weighing 252.458 troy grains. The troy pound is 5760 grains, or 22.8157 inches.

The avoirdupois pound is 7000 grains, or 27.7274 inches. The pound avoirdupois is considered the *imperial* pound; and it is to the troy as 7000 to 5760, or 175 to 144.

10 avoirdupois lbs., or 277.274 cobic inches, water are the imperial gallon; and 12.15 lbs. troy are the same gallon.

One troy lb. = 0.822857 Imperial lbs.

One Imp. lb. = 1.215271 lb. troy.

The weight of a cubic inch of distilled water, in a vacuum, is 252.722 grains, and in air is 252.456 grains.

In Troy Weight, 24 grains make a pennyweight, (meaning grains of wheat) 480 an oz., and 5760 a lb.; or 20 dwt. an oz. and 12 oz. a lb.

In Apothecaries' Weight, 20 grains make a scruple, 60 a drachm; and then as in troy weight, 480 make an oz. and 5760 a lb. There are 12 ounces to the lb., 8 drams to an ounce, 3 scruples a dram, and 20 grains or drops to a scruple. The dram is 60 grains.

In Avoirdupois Weight, 16 drams make an oz.; 256 a lb.; 16 oz. a lb.; 112 lbs. a cwt.; and 20 cwt., or 2240 lbs. a ton.

175 lbs. troy are equal to 144 lbs. avoirdupois; and 175 oz. troy are equal to 192 oz. avoirdupois.

80 oz. avoirdupois are eqoal to 73 oz. troy; and 14 lbs. avoirdupois to 17 troy. A troy pound is 13 oz. 2.65 drams avoirdupois; and a lb. avoirdupois is 1 lb. 2 oz. 11 dwt. 16 grs. troy.

The avoirdupois lb. of 7000 grains is 453.61 French grammes; and the troy lb., 5760 grains, is 373.14 grammes.

Henry III. enacted that an ounce should be 640 dry grains of wheat; 12 oz. a lb.; 8 lbs. a gallon of wine; and eight gallons a London bushel. Latterly, the malt liquor measure has been 282 inches to the gallon, and the wine measure 231.

A bale of Egyptian cotton is 90 lbs., of Brazil 160, of Georgian and Sea Islands 280, Orleans 300, East India 300, West India 350 to 400.

A seam of glass is 24 stone, of 5 lbs. each.

A sack of wool is 22 stone of 14 lbs. or 308 lbs. In Scotland, it is 24 stone of 16 lbs.

A pack of sheep's wool is 240 lbs.

A tod of wool is 2 stone of 14 lbs. each, and a sack is 13 tod. 12 sacks is a last, or 4368 lbs.

56 or 60 lbs. is a truss of hay, old or new, and 40 lbs. a truss of straw, 36 trusses being a load.

The French gramme is 15.434 English grains.

The smaller French weights are in tenths, decreasing, as *deci, centi,* and *mili grammes.*

The larger are *deca, hecato, chilio,* and *mirio grammes,* in tenths, increasing.

The kilo-gramme, or 1000 grammes, is equal to 2 lbs. 2 oz. 4 grains avoirdupois.

The London Mint, in 1820, determined the French kilo-gramme to be 15433 grains English, and the French pound 7555 grains.

The livre, or French pound, is 500 grammes, or 7714 grains English, or 1 lb. 1 oz. 10⅓ drams avoirdupois. The quintal, 100 kilo-grammes, is 220.486 pounds.

The quintal is ten mirio-grammes, or 2 cwt., or 224 lbs., English, nearly.

The American quintal is 100 lbs.

The Spanish *quintal* is 4 arrobas, or 101½ lbs. avoirdupois. The *arroba* measure is 4¼ and 3¾ English gallons. The *vara*, or Spanish yard, 0.927 English yard.

The Mysore cutcha seer is 9 oz. 11¼ drams.

The Bengal maund is 74 lbs. 10 oz. 10⅔ drams avoirdupois; the seer 1 lb. 13 oz. 13.866 drams; the chattock 1 oz. 13.366 drams. The Bazar maund is 82 lbs. 2 oz.

The Portuguese arroba contains 32 Lisbon lbs. of 7005 grains.

The Venetian mirre contains 30 lbs. of 4215 grains.

100 lbs. Leghorn equal 74.864 English, or 77 lbs. English. The quintal 100 lbs. English.

The Turkish quintal is 124 5 lbs. avoirdupois.

The Schippondt of the northern nations is, in Sweden, for copper 320 lbs. of 9211 grains, and for provisions 400 such lbs. At Riga it is 400 lbs. of 6149 grains. At Hamburgh 300 lbs. of 7315 grains.

100 lbs. English is equal to 112⅔ lbs. of Russia, to 93 lbs. 5 oz. of Hamburgh, and to 132 lbs. 11 oz. at Leghorn, and 104 lbs. 13 oz. in Portugal, 91 lbs. 8 oz. at Amsterdam, 152 lbs. at Venice, 154 lbs. 10 oz. at Naples, and 97 lbs. at Cadiz.

63 Russian poods, of 35⅛ lbs. English, is a ton English; and 120 poods is a Russian last of tallow.

The commercial lb. of Amsterdam is 7636 grains, and the troy lb. equal to 7602 grains. The Dutch stone is 16 lbs. The Norway lb. is 7833 grains. The Spanish lb. is 7038 grains.

The Turkish lb. is 7578 grains. The Danish 6941. The Irish 7774. The Naples 4952. The Scotch lb. troy 7620.8. The Smyrna lb. 6944.

Solids and liquids are sold by weight, in China, even fire-wood and wine.

10 cash 1 candareen.
10 candareens 1 mace.
10 mace 1 tael.
10 taels 1 kin, or catty.
100 catties 1 pecul, or 133⅓ lbs.

The Chinese kin is 5802 grains, or 375$\frac{8}{10}$ French grammes.

The Pearl at Canton is 100 catties, or 133⅓ lbs. The catty is 16 taels of 1⅓ oz.

In Greece, a drachma was 2 dwt. 16 grains. A minæ 1 lb. 1½ oz. A talent 67 lbs. 7 oz. 5 dwt.

The Roman weights were the As, equal to twelve ounces, and the uncia, an ounce.

A cubic foot weighs—

Of loose earth or sand	95 lbs.
Of common soil	124
Of strong soil	127
Of clay	135
Of clay and stones	160
Of mason's work	205
Of distilled water	62.5
Of pure gold	1203.625
Of pure silver	654 8
Of cast iron	450.45
Of steel	489.8
Of lead	709.5
Of platina	1218.75
Of copper	486.75
Of cork	15
Of Portland stone	157 5
Of tallow	59
Of oak	73.15
Of brick	125
Of crown glass	180.75
Of fir	34.375
Of mahogany	66.4
Of air	0 0753

Also see *Specific Gravities* for the relations of these bodies to water.

100 lbs. at the Equator would be 100 545 at the Poles, and 100.334 at London.

N. B.—Though the new weights and measures are adopted by law and government, yet custom and prejudice have obstructed their general use.

MEASURES OF LENGTH.

MEASURES in length are the distance of one object from another in some agreed standard.

A line is the 16th of a digit, and the 100th of a foot.

A *digit* measure is ¾ths of an inch, or 4 barleycorns laid breadthways.

A hair's breadth is the 48th of an inch. 3 hairs are 10 lines.

A barleycorn is .00217th of a cubic

inch, or about 461 make a cubic inch, or 3 to an inch in length.

A geometrical *pace* is 4.4 feet English.

A statute mile contains 1200 paces, or 1760 yards, or 5280 feet.

A Scotch mile conta'ns 1500 paces.

A nautical league is $\frac{1}{20}$th of a degree, or $\frac{1}{20}$th of $69\frac{1}{12}$ miles.

The log-line adopted in the navy is 48 feet.

A sea league is 3.45 statute miles, or the 20th of a degree, or 3 sea miles.

6051 feet are a sea mile.

A degree of latitude is $68\frac{3}{4}$ English miles at the equator, and, according to Biot, &c. $68\frac{3}{4}$ in France; but per Mudge, in England, $69\frac{1}{7}$. 69 is its proper popular quantity.

A nail's length is the 16th of a yard, or $2\frac{1}{4}$ inches.

A *hand* used for horses is 4 inches.

A surveyor's chain is 4 poles, or 66 feet, divided into 100 links of 7.92 inches. A square chain is 16 poles, and 10 square chains are an acre.

640 acres is a square mile, and 4840 square yards is an acre, 169.58 yards each way.

The Irish acre 7840 square yards.

121 Irish acles are equal to 196 English.

11 Irish miles are equal to 14 English.

The Scotch acre is 1.27 English.

48 Scotch acres are equal to 61 English.

80 Scotch miles are equal to 91 English.

A palm is 3 inches. A fathom 6 feet. 3 palms, or 9 inches, a span. 5 feet is a common pace.

The French metre is 36.9413 French inches, or 39.371 English, or 3.2389 feet.

An Eng. foot is 0.3048 metres

An Eng. yard is 0.9144 metres

An Eng. mile is 1609.3059 metres

An Eng. acre is 4046.6648 sq. metres

A great league in France is 3000 paces, and a mean league 2500.

A French *arpent* is $\frac{5}{6}$ths of an English acre.

The Turkish dreah, or pik, is 3 palmi, or 26.41 inches, and the lesser pik is 19.03 inches.

The jaghire is 10.46 English inches. A cawney is rather more than an acre.

A Bengal coss is 6000 feet, or 1 mile 240 yards.

A haut or cubit is 18 inches.

A baggah of land is 1600 square yards, about a third of an acre.

The Paris foot is 9 lines shorter than the English foot, or 0.91 to 1.

The Rhinland or Leyden foot is 0.86925 English.

The Amsterdam foot is .927 of an English foot.

The Berlin foot .992.

The Bologna foot 1.25.

The Brussels foot .95.

The Chinese imperial foot 1.05.

The Chinese foot measures are from 12 to 13 inches. 200 lis is a degree of the meridian $69.\frac{1}{6}$ miles.

The Turkish foot 1.165.

The Florence foot .995.

The Geneva foot 1.919.

The Hamburgh foot .933.

The Portuguese foot .952.

The Madrid foot .915.

The Moscow foot .928.

The Roman palm .733.

The Roman foot .966.

The Swedish foot 1.073 English feet.

The Venice foot 1.14.

The Vienna foot 1.036.

The Wirtemburg foot 11.28.

The Amsterdam ell is 2.233 feet.

The Brabant ell 2.268

The Scotch ell is $37\frac{2}{10}$ inches.

The Venice ell 2.089.

The Venetian ell is $\frac{8}{15}$ths of the French ell.

The candi of India is equal to the Venetian ell.

The Italian mile 5290 feet.

The Neapolitan mile 4 German miles, or 60th of a degree.

The Roman mile $\frac{1}{75}$ of a degree.

A German mile 4800 paces. A Swedish and Danish mile 5000. The Russian mile 750.

The geographical or Italian mile is 1000 geometrical paces, or $\frac{5}{6}$ths of an English mile.

The Rnssian *werst* is 3598 English feet, about two-thirds of a mile.

The Scotch mile 5952 feet.

The Vienna post mile 24888 feet.

The German mile is the 15th of a degree of latitude, or 4.6 miles English.

The Roman *braccio* is 4 palms. The *canna* 8 palms.

The Spanish league 4 miles English.

The Chinese lis is 629 yards.

The Levant pig is three-fifths of the French ell.

In Siam, the ken is 36 inches nearly, and is divided into 2 socks. These into 2 keubs, and each keub into 12 nions, at three-fourths of an inch.

17 Spanish leagues is a degree, or about 4 miles, which is the Dutch and German league. The Persian league, or parasang, is 30 stadia or furlongs.

The French *metre* 39.37079 E. inches. The metre is 443.2959 lines, and .513074 of a French toise. 8 chiliometres is about 5 miles English. 1000 E. feet is nearly 305 metres.

The *metre* is the ten millionth part of the quadrant of the earth from the equator to the north-pole. It differs

slightly from the length of a pendulum, which, in the latitude of London, vibrates seconds in a vacuum, at the level of the sea, where it is 39.1393 inches; therefore, the metre is only .23149 of an inch longer than our pendulum.

The *millemetre*, or thousandth part, .03937 inches English.

The *centimetre* .30371.

The *decimetre* 3.93708.

The *decametre* is ten times the metre.

The *hecatometre* 100 times.

The *chiliometre* 1000 times, and the *miriometre* 10,000 times.

The *are* is 3.95 English perches.

An inch English is 2.54 centimetres, a yard is 0.91438 metres, and a mile is 1609.3149 metres.

The metre, by the Convention, was taken as 6217.857 English miles, or 3280917 feet, and a mean degree at 69.0429.

A centesimal degree is 54 minutes.

A league, at 25 to a degree, is 2 7617 miles.

A post league 2000 toises, or 2.3 miles English.

A toise being 6 feet 6$\frac{3}{4}$ inches English. The pied one-sixth of the toise, and the aum 3 feet 11$\frac{1}{4}$ inches English.

In Greece, a digit was $\frac{3}{4}$ths of an inch, a cubit 13$\frac{1}{2}$ inches, and a large cubit 18$\frac{1}{8}$ inches. A pace 2 yards and $\frac{1}{4}$ an inch. A stadium 201 yards 1 foot 3$\frac{2}{3}$ inches. 8$\frac{2}{3}$ stadia a mile nearly. The plethron 10000 square feet.

The Roman foot was 0.915.

A span was 10.944 inches.

Ezekiel's reed was 10 feet 11$\frac{1}{4}$ inches.

A sabbath day's journey was 1155 yards, or about two-thirds of a mile. A day's journey was 33$\frac{1}{2}$ miles.

The Egyptian cubit, or ardub, was 21.888 inches.

The Greek foot was 12$\frac{1}{4}$ inches.

The Hebrew foot was 1.212 English feet. The Hebrew cubit 1.817, the sacred cubit 2 English feet, and the great cubit 11 English feet.

The stadium was 625 feet, and the milliarium 5000 feet.

A hide of land was one plough's work.

An ox-gang is 15 acres, or as much as one ox can plough in a year.

The measures of degrees of latitude are various, proving, in the main, the oblate figure of the earth.

Lat.	0	. . . . .	68.732	Eng. miles
	12° 32′	. . .	68.743	
	33 18	. . .	69.076	
	40 —	. . .	68.630	
	43 —	. . .	68.998	
	44 44	. . .	69 061	
	44 52	. . .	68.769	
	45 —	. . .	69.092	
	49 —	. . .	69.121	
Lat.	49° 22′	. . .	68.945	Eng. miles
	— —	. . .	69.119	
	51 30	. . .	69.146	
	53 15	. . .	69.545	
	66 20	. . .	69.403	
	60 20 30″	.	69.292	

The mean of the 15 is 69.0448 or 69$\frac{1}{23}$th. But the bulk of the earth ought to be taken according to the equatorial measure or 68.732, which by 360°, gives 24743 miles for the circumference at the equator, and 7876.3 as the diameter, *usually* taken as 7924, while the polar diameter is about 16 miles less, and the mean 7916.

Degrees of longitude are the 360th part of the constantly-diminishing parallels of latitude exactly, as under.

At equator	. . .	68.732
10 degrees	.	67.694
20	. . . . .	64.587
30	. . . . .	59.523
40	. . . . .	52.652
50	. . . . .	44.186
60	. . . . .	34.366
70	. . . . .	23.507
80	. . . . .	11.935
90	. . . . .	0.000

At London 51°. 32′, a degree of longitude is exactly 42.755.

Given distances east or west are converted into degrees of longitude by the preceding scale, or degrees into distances in miles.

It is usual to take a degree at the equator as equal to the degree of latitude in the country as in England 69.146; but the mean degree is 68.732 miles.

This is important, because the solar parallax demands 23578 (23564,) semi-diameters for the sun's distance, and the smaller size gives 92896000 miles, and the larger 93322000. So also in the editor's new physical calculation, the rotation per second is either 1519.8 or 1524, giving 93,036640 or 93294000. Semi-diameter × 23578 = distance; or rotation per second × 4 × fall per second = orbit motion per second, which by seconds in a year and divided by 6.2832 is also the distance, both depending on the true measure of a degree.

The pendulum which vibrates seconds 39.1393 inches at London, is the proposed new standard for British measures. 1 mile would be equal to 1618.833 such pendulums.

MEASURES OF TIME.

Time is best defined as the succession of motion and phenomena, independent of relative human perceptions.

Time is measured by man by the impressions of successive ideas, and these diminish in a ratio of their own

increase; consequently, time appears less as men advance in age, or are variously emplnyed. At ten, a year seems to be twice as long as at twenty, three times as at thirty, four times less at forty, five times at fifty, and six times at sixty: circumstances of employment and position being the same. Hence a month employed in travelling seems equal to three of usual pursuits. Time being mentally measured by the impressions of new ideas.

Absolute time, independent of the feelings of individuals, is measured by certain regular motions, as the rotation of the earth, the swing of a pendulum, the fall of a body, the revolutions of the moon round the earth, or the earth round the sun.

Time is generated by motions and the succession of human ideas and perceptions, and periods and duration arise entirely from relative motions. Thus the motions of the earth generate days and nights, seasons and years. Those motions therefore include all the products and events of time on the earth, whether national or personal, and all events and incidents begin and end in the finite motions of the earth, at once as cause, means, beginning, and end.

The *tropical* year is 365 days 5 hours 48 minutes 51.6 seconds.

The *sidereal* year, or return to the same star, is 365 days 6 h. 9 m. 11°.

But as the line of apsides or aphelion point advances 655 seconds, the orbit is completed in 365 days 6 h. 15 m. 20 s., and this is called the *anomalistic* year.

The Chaldeans made the sidereal year 365 days 6 h. 14 m., or one minute 49 seconds more than our present year, and the tropical year 365 days 5 h. 49 m. 30 s., being 38 m. 4 s. more than ours.

If Hipparchus was right in his measure of the tropical year, it is 11.2″ less than in his time. The Brahmins made it 1 m. 43 s. more than now.

The astronomical equinoxes are on the 21st of March and 21st of September, and the sun is in the tropics on the 21st of December or June.

The precession of the equinoxes is performed in 25868 years; and the revolution of the line of apsides in 20931. The precession of the equinoxes is 50″. 25 per annum, or 1° 23′ 45″ in a century. The advance of the apsides is 61″.9 per annum, or 1° 43′ 10″ in a century.

Leap-year is the year which divides evenly by four; but the year 1900 will not be leap-year, to make up for the odd minutes gained between the astronomical and computed year, as 365 days.

The sun is 7 days 16 hours 51 min. longer in the northern signs than in the southern.

Northern signs:

From the spring to the summer solstice is ....92d. 21h. 45′

From the summer to the autumnal equinox ......93d. 13h. 35′

Southern signs:

From the autumnal to the winter solstice ....89d. 16h. 47′

From the winter to the spring equinox ....80d. 1h. 42′

Quarter-days in civil reckoning are March 25, June 24, Sept. 29, and Dec. 25, being festivals of the Catholic Church.

The synodical lunar month of her departure from the sun's centre to the return, or from full to full, is 29 days 12 h. 44 m. 12 s., and was the universal month of the ancients, twelve being accounted a year.

The difference between a solar and ancient lunar year is 10 $\frac{127}{235}$ days.

The sun and moon return to the same relative positions every 223 lunations; or, according to the ancient Chaldeans, in 6585 days 8 hours. Our modern tables make it 17.29″ less.

The Eastern nations, where the day varies little, reckon the day from sunrise. The Romans reckoned as we do, from midnight.

Christian nations assign thirty days to April, June, September, and November, thirty-one to other months, and twenty-eight to February, making three hundred and sixty-five; but three hundred and sixty-six in leap-year, when February is twenty-nine.

The Romans added the day in leap-year on the sixth of the calends of March, making two *sixths*, or *bis sextus*, and hence the word Bissextile.

The *astronomical* day is the time which elapses from the sun's being on the meridian of a place till his return, divided into twenty-four hours of sixty minutes. And astronomers begin the day at the departure of the sun from the meridian of the place, counting twelve hours till midnight, P. M. or after; and twelve hours from midnight till noon A. M. or before: their day after twelve at night being a day later than *civil reckoning*, which begins a new day at twelve at night, and reckons from twelve at night to twelve the next night.

As the earth advances in its orbit 61′ 11″ when in its perihelion, and only 57′ 9″ when in its aphelion, while it returns the same meridian to the sun, that meridian arrives at the same *fixed* star in twenty-three hours 56′ 4″.1 or 3′ 55″.9 less. Others make

it twenty-three hours 56′ 34″ and 3′ 56″.6 less.

Sidereal days are always the same, and accord with a true clock; but owing to the unequal velocity of the earth its orbit in the perihelion and aphelion, the sun's return to the meridian varies; and also as the earth's path is inclined to the axis of rotation, the solar days vary. Owing to the first cause, the extreme difference is 7′ 39″ on March 21, and 6′ 5″ on May 6; 0 on July 1, making the sun slower than the clock; but owing to the obliquity it is 0 on March 21; 9′ 53″ on May 6th, and 0 June 22, making the sun faster than the clock. The combination of both causes produces the table of equation of time by which true clocks ought to be kept faster or slower than the meridian sun or a sun-dial, called *apparent* time, and the other true or mean time. A clock and a sun-dial vary as follows:—

Jan.	1	4		August	9	5	Clock faster
	3	5	Clock faster than the Sun		15	4	
	5	6			20	3	
	7	7			24	2	
	9	8			28	1	
	12	9			31	0	
	15	10		Sept.	3	1	
	18	11			6	2	
	21	12			9	3	Clock slower than the Sun.
	25	13			12	4	
	31	14			15	5	
Feb.	10	15			18	6	
	21	14			21	7	
	27	13			24	8	
March	4	12			27	9	
	8	11			30	10	
	12	10		Oct.	3	11	
	15	9	Add to app. time.		6	12	
	19	8			10	13	
	22	7			14	14	
	25	6			19	15	
	28	5			27	16	
April	1	4		Nov.	15	15	
	4	3			20	14	Subtract from app. time.
	7	2			24	13	
	11	1			27	12	
	15	0			30	11	
	19	1	Clock slower.	Dec.	2	10	
	24	2			5	9	
	30	3			7	8	
May	13	4			9	7	
	29	3			11	6	
June	5	2			13	5	
	10	1			16	4	
	15	0			18	3	
	20	1	Clock faster		20	2	
	25	2			22	1	
	29	3			24	0	
July	5	4			26	1	Faster
	11	5			28	2	
	28	6			30	3	

In 365 solar days, the earth turns 366 times on its axis, and by this exact quantity it gains in its orbit, with reference to the sun and stars in every revolution, and hence the precession of the equinoxes. For, as the orbit is caused by the sun, and the equinoxes have reference to the sun, and not to the stars, so the equinoxes fall back 24,890 miles, or in space 50.3″, with reference to the stars. Every other body, like the earth, turns once on its axis by going round a central body, and this therefore is the cause of the advance of the equinoxial points.

The Chaldeans, Egyptians, and Jews, began their civil year from the autumnal equinox. The Persians, Greeks, Romans, and the English till 1752, began the year at the vernal equinox. Thence, to make dates agree with those of other nations, between January and Lady-day, our writers used to put two dates, as Feb. 10, $\frac{1708}{1709}$. The bottom date being that from Jan. 1, and the upper that from the previous Lady-day.

The Pendulum for true and exact measuring of time was a suggestion of Gallileo, in consequence of his observing the oscillations of a chandelier in a cathedral. Every oscillation, whether long or short, of the same pendulum, is performed nearly in the same time. A pendulum which vibrates seconds at London, ought to be 39.1393 inc. nearly, and the length of pendulums for less or greater times is as the square of the times: thus, for half a second, it would be the square of $\frac{1}{2}$, or $\frac{1}{2} \times \frac{1}{2} = \frac{1}{4}$; so that $\frac{39.139}{4} = 9.78425$ inches is the length of a half seconds pendulum at London.

At St. Thomas's in lat. 25′, the seconds pendulum is 39,02069; and at the Gallipagos, in lat. 0° 32′, it is 39.01717 inches.

At Maraham, in 2° 32′ it is 39.01197.

Hence Capt. Sabine calls the equator 39.0152 inches, and he calculates it to be at the Poles 39.21765, considering the ellipticity as 289.1, which La Place makes 306 75.

The highest latitude yet taken is 79° 50′, and here it is 39 21464. At Greenland, in 74° 32′, 39.20328; at Hammerfest, 70° 40′, 39.19512; and at Unst, in the Orkneys, in 60.45, it is 39.17145.—*Biot.*

At Paris, 48° 50′, it is 39 12843; at London, 51° 31′, 39.13908; and at Bourdeaux, 44° 50′, 39.11282; and Clermont, lat. 45° 47″, 39.11313, giving 39,11813 for the mean latitude of 45°, which Sabine makes 39.11654.

By the most perfect admeasurements made by French engineers, between

In India a day is divided into 60 ghurries, a ghurry into 60 puls, a pul into 60 prans, and a pran into 10 tas, in $\frac{2}{5}$ths of a second.

The Mahomedans, for 1830, began June 22; 1831, June 12; 1832, May 31; 1833, May 21; 1834, May 10; 1835, April 29; and, going back, will be in 1895 on June 22 again; and in another sixty-five years, or 1960, they will begin the year on June 26th.

The Hegira, or Flight, took place July 16, 622, and is the Mahomedan era. Their year is 12 lunar months, or 354 days, 8 hours, 48 minutes; and eleven days being lost, a year must be allowed every thirty-three, to reconcile their dates with ours.

The Mahometan year in 1829 was 1244, and ended July 2, beginning July 14.

The periodical month of the Turks and Arabs, or siderial period of the Moon, is 27d. 7h. 43′ 48″. The synodical month, or return to the conjunction of the Sun, is 29d. 12h. 44′ 3″ 11 thirds.

The Roman *lustra* were periods of 5 years; and the Greek olympiads periods of 4 years; and the first commenced in 776 B. C.

The Metonic cycle was 19 years, intended to be equivalent to the Chaldean period. It was afterwards adopted as the golden number for Easter.

The Jews began the year in March, and the months were Nisan, Zif, Sivan, Tammuz, Ab, Elul, Tisri, Bul, Cislieu, Tibeth, Shebat, Adar. The Sabbath, or seventh day, is Saturday. The days and nights, from sun-rise and sun-set, were divided into twelve equal parts or hours, 1, 2, 3, &c. The night watches were three hours each, from sun-set to sun-rise. The months were lunar, or 30 and 29 days, and they introduced an extra month every two or three years. The day commences and ends at sun-set.

The Jewish months were alternately 29 and 30 days, and their year of twelve lunations 354 days. Their year commences with the vernal equinox. To recover the four days they intercalate a whole month after every two or three years, following their twelfth month, or Adar; and they call this extra month Ve-adar.

The Jewish day commences at six in the evening, or sun-set, and continues till the same hour on the following evening.

Their civil year commences with the new moon near the vernal equinox, in the month called Tisri, of 30 days, corresponding with part of September and part of October.

The year 1829 was the Jewish year 5589, and ended Sept. 27, beginning Sept. 9, 1828.

The Persians give names to every day in the month, just as we give them to days of the week.

Saturday, the 7th day, is, by the Arabs, called *Sabt*. And Monday is called Jama, in all the Eastern languages.

The months, or lunar periods, are Roman; and September, October, November, and December, were so called when the Roman year began in March.

April is so called from Aperit, the Spring.

September, &c. were the 7th, &c. months of the year of Romulus.

As the orbits of the planets complete their seasons, their periods are taken to be their years; hence Mercury has nearly four years in ours, Venus two-thirds; Mars is nearly 4 times as long, Jupiter 12 times, Saturn 30, Herschel, 83, and more distant planets longer.

CHRONOLOGY.

It is a mere speculation to speak of ages or events before there were records, before there were epochs, and even before there existed some advances in chronological science. There was no written character till about 1700 or 1800 B. C.—the Jews had no epochs—the Greeks none, till the Olympiads—and the Chinese none till about 70 B. C., when they established some cycles. Chronology and history plunge, however, into remoter periods, and we cannot do other than recognise them, but with some doubts, for traditions are worthless beyond a century.

Chronologists distinguish dates and epochs by letters; as A. M. Anno Mundi, A. C. Anti Christi, or B. C. before Christ, and A. D. Anno Domini, or A. C. after Christ.

A. U. C. *ab urbe conditor*, from the building of Rome, 753 B. C. Greek epochs are marked *Olym.* meaning the number of the Olympiad, which began 776, in periods of four years, beginning from our July, or their Hecatombeon. Hence the year 0 of Christ answers to the 4th year of the 194th Olympiad.

The Dominical Letter is the Sunday letter of the year, A being always taken as January 1, and A, B, C, D, E, F, G, being the Dominicals. The 52 weeks give but 364 days, instead of 365; the Dominical letter, therefore, falls back *one* in every succeeding year, and two when 366 days, or in leap-year.

To find the Dominical or Sunday Letter for any given year:

Divide the centuries by 4.

Take twice what remains from 6.

Add the remainder to the odd years above the even centuries in the given year, and their 4th.

Divide their sum by 7.

The remainder taken from 7 will leave the number of the letter, counting A 1, B 2, &c.

To find the *Golden Number*, or year of the *Lunar Cycle*, add 1 to the date and divide by 19, then the quotient is the number of cycles since Christ, and the remainder is the Golden Number.

The Dominical Letter for 1833 is F, the Golden Number 10, the Epact 9.

Easter Day April 7. Whit-Sunday May 26.

The Cycle of the Sun is the 28 years before the days of the week return to the same days of the month. It is found by adding 9 to the date of the year, and dividing by 28; the quotient is the number of cycles, and the remainder is the number of the cycle wanted.

The Epact is the moon's age on the 1st of January. A year is 12 moons and 11 days. To determine this from 1800 to 1900, subtract 1 from the Golden Number, found as above, multiply by 11, and divide by 30, and the remainder is the moon's age for January 1.

To find the moon's age on any day, add the epact of the year, the epact of the month, and the day of the month together; if less than 29½, it is the moon's age; if more, take 29½ from it. The epact of the month—0 for January, 2 for February, 1 for March, and 3, 4, &c. to 10 from April to December.

The time of the moon's southing is four-fifths of an hour later every day from the last new moon.

Easter is the first Sunday after the first full moon that occurs after the 21st of March: to find it add 6 to the epact, and subtract from 50, or if the sum is above 30, subtract the remainder, and the difference is the day of the full moon, counting from after March 1; this is called the Easter limit, and Easter Sunday is the following Sunday. To fix the day of the month add 4 to the number of the dominical letter for the year, and subtract the sum from the Easter limit; then take this remainder from any multiple of 7 *greater* than the said remainder, and add the new remainder to the Easter limit, and the sum will be the day on which Easter Sunday falls in March, if less than 31, or in April, if more than 31.

The *Solar* Cycle is a period of 28, when the days of the week and month again coincide.

The Cycle of *Indiction* was 15, and began 3 B. C.

The three cycles, 19, 28, and 15, multiplied, produce 7980 changes, after which period, they return in the same order as before; and this is called the Julian Period. The year 1 of Christ is 4714 of this imaginary period.

The Epact is the eleven days which the solar year exceeds twelve lunations.

The metonic cycle of 19 years is 1h. 29 minutes more than 235 lunations of 29d. 12h. 44′ 2″ 48‴ *i. e.* 8 hours in 100 years and a day in 300 years.

The difference between the common Julian year, 365.25, and the true year 365.242222 is .007778; *i. e.* it is 11′ 12″, or a day in 128½ years nearly.

The Christian festivals appear to have been fixed astrologically. The feast of the Virgin Mary being fixed on the day the sun enters Aries, that of John the Baptist on entering Cancer, that of Michael on entering Libra, and that of Jesus on entering Capricorn, being the four cardinal points. So they fixed the other saints' days on the day the sun entered the other signs; St. Paul on entering Aquarius, Matthew on entering Pisces, Mark on entering Taurus, Corpus Christi on entering Gemini, St. James on entering Leo, St. Bartholomew on entering Virgo, Simon and Jude on entering Scorpio. This, at least, is the opinion of Hewlett and others, and the days correspond, allowing for the precession of the equinoxes.

Epiphany, or 12th Day, celebrates the arrival of the wise men of the East.

Plough Monday is the end of Christmas.

The Purification, or Candlemas, celebrates the Jewish ceremony of the presentation of the Mother of Jesus.

Quadragesima Sunday is the first Sunday in Lent, Septuagesima is the Sunday before, and Quinquagesima precedes.

Ash Wednesday is the day which commences the forty days of Lent, when for four days the Popes sprinkle ashes.

Lady-Day the day of the Virgin's miraculous conception.

Palm Sunday celebrates Christ's entrance into Jerusalem.

Maunday Thursday when kings give alms, &c. to the poor.

Good Friday celebrates the Crucifixion.

Easter Sunday celebrates the Resurrection.

Ascension-day is forty days after Easter Sunday.

Whitsunday is forty-nine days after Easter Sunday, and also the day of Pentecost.

Trinity Sunday is the next after Whit-Sunday.

Lammas was an ancient quarter-day, according with Whitsuntide, Martinmas, and Candlemas.

Michaelmas is a festival in honour of Michael and the Angels, recorded in the Revelations, and an angel much spoken of by magicians.

All Saints is a day of prayer for saints who have no special days.

Advent Sunday is that which is nearest to St. Andrew's day.

Christmas celebrates the birth of Christ.

St. Stephen's and the Holy Innocents celebrate the massacre of the first martyr and the children by Herod.

Easter is a festival of Phœnician origin, called Estarte or Ashtaroth.—*Landseer.*

Plough Monday was the feast of the plough, in honor of agriculture.

St. David's Day is March 1, St. Patrick's March 17, St. George's April 23, St. Andrew's Nov. 30, and St. Deny's Oct. 9.

These and other days, to the number of 300, besides Sundays, used to be celebrated by the Catholic Church, and being identified with the customs of the nation, have been preserved in the Anglican Church, though they are unknown and unnoticed by Dissenters. They fill up a column in the Almanacks, and they are so numerous in Spain, &c. as to render 300 days mass or holidays.

The Christian Æra was first adopted so late as the sixth century, in the reign of Justinian; and hence the various difficulties of fixing it with precision: but it is generally considered as commencing in the year 4004 from the creation of Adam.

Jesus Christ is believed to have been born in the 43d year of Augustus, when Lentulus and Piso were consuls, in the 4th of the 194th Olympiad, and 4004 or 4005 from Adam.

Easter is a festival which the early Christians kept on the same day as the Jewish Passover, and others kept it on the first Sunday after the first full moon in the year; but it is now kept on the Sunday which follows the full moon after the 20th or 21st of March.

Chronologers adopt the following epochs:—

Creation	4004 B. C.
Deluge	2348
Calling of Abraham	1921
Argonautic Expedition	1225
Destruction of Troy	1184
1st Olympiad	776
Building of Rome	753
Nabonassar	747
The Seleucidæ	312
The Battle of Actium	38
Dioclesian	284 A. C.

The chief epochs of Jewish chronology, according to received authorities, are as under:—

Creation of Adam	4004 B. C.
Deluge	2348
Death of Abraham	1821
Drowning of Pharoah	1401
Death of Joshua	1443 B. C.
Death of David	1015
Division of the Kingdom between the Ten Tribes and two	975
Dispersion of the Ten Tribes	721
Captivity of the Two	606
Return of the Two from Babylon	536
Death of Judas Maccabeus	161
United to the Roman Empire	63

The Alphonsine Tables make the Creation 6934 B. C.

The period from Adam to the Flood is, by the Hebrew version, 1656 years; the Samaritan 1307, the Septuagint 2262, and Josephus 1556.

The epoch of the Mosaic creation is fixed by the Samaritan Pentateuch at 4700 years B. C. The Septuagint makes it 5872. The authors of the Talmud make it 5344; and different chronologers, to the number of one hundred and twenty, make it vary from the Septuagint date to 3268. Dr. Hales fixes it at 5411; but the Catholic church adopted the even number 4000, and subsequently, a correction as to the birth of Christ, adds four years: therefore, it is now generally considered as 4004 years, which agrees with the modern Hebrew text. The modern Jews call this the year 5590, which carries the commencement to the year 3761 B. C.

The Greek Church dates the Creation 5508 years B. C. and begins the year in March.

The early fathers placed the year of the Creation 5502 B. C., and added the year A. D. to it. Others made it 5492, and the latter, 16 years less than the Greek Church, is still used by some Eastern Churches.

The modern Jews date the Creation 3760½ B. C., and the year A. D. added gives the Jewish year; thus, 1830 A. D. is 5590 Jewish.

The Jews still celebrate as fasts the days of the death of Moses, Miriam, Joshua, Elijah, Samuel, Aaron, Gedaliah, and Herod.

The Mahomedans celebrate the defeat at Vienna, the taking of Constantinople, and the birth of Mahomet.

The Julian period is merely the arithmetical product of three cycles. It is in chronology like a balance-wheel in mechanics. The multiplier is 7980, and our era begins in its 4713th year.

The early Christians, till the era of the birth of Christ was estimated, dated from the accession of Dioclesian in 284, called the era of Martyrs. The Coptic Christians still adopt it, beginning the year on the day of Dioclesian, Aug. 29, or in the month Thoth.

The era of the Seleucidæ, 311 B. C., of Alexander 323 B. C., and of the bat-

tle of Actinm 31 B. C., of the Cæsars 38 B. C., of Tyre 125, of Abraham 2016, and of Antioch 49, were also used by some early writers.

The rising of Arcturus, in the age of Hesiod, gives 3233 years (for 45°) since his time, or the year 1400 B. C. nearly.

The Hindoo era of the Caliyug began 3101 B. C. or 750 years before the Deluge in 2348, and they count their months by the progress of the sun through the zodiac. The Samoat begins 57 B. C., and the Saca 77 A. C. All used.

The cycle of Jupiter is 60 years, or Sexagenary, and they are now in the 35th year of the 84th cycle, every year having a proper name.

The Chinese adopt also the Sexagenary cycle of 60 years, giving a name to each year. Seventy-five cycles have elapsed, and they are now in the 76th era, commencing in 2700 B. C. or 350 before the Deluge. It was established by the Emperor *Hoang-te*, and is also adopted by the Japanese.

The Mexican era began in 1090, A. C. and their year was correctly astronomical.

The year 1830 corresponds to the year 6543 of the Julian period.

Since the First Olympiad 2606.

Since the foundation of Rome 2583.

Since the era of Nabonnassar 2578.

The following are the most memorable events in Jewish and other histories, reckoned backward from the birth of Christ.

The Deluge	2348
Babylon built	2247
Kingdom of Egypt founded	2188
Birth of Abraham	1993
Semiramis flourished	1990
Argos founded	1856
Thoth invented letters and the lyre	1800
Memnon flourished	1800
Sesostris flourished	1722
Death of Joseph	1635
Moses born	1571
Athens founded	1556
Cadmus founded Thebes	1493
Moses died	1451
Tyre and Sidon rivals	1448
The first Olympic games	1443
The Argonautic Expedition	1263
The Pyramids built	1250
Troy taken	1209
Codrus, King of Athens	1069
David, King of Israel	1053
Solomon's Temple finished	1004
Homer and Hesiod flourished	907
Death of Lycurgus	873
The First Olympiad	776
Rome founded	753
Samaria taken, and tribes dispersed	721
The Pentateuch found by Hilkiah	625
Nebuchadnezzar flourished	600
Solon and Thales flourished	594
Jerusalem taken and destroyed	587
Cyrus became King of Persia	559
Babylon taken by Cyrus	538
The Tarquins expelled	509
The Battle of Marathon	490
Aristides banished	484
The sea-fight at Salamis	480
Herodotus flourished	445
Phidias flourished	440
The Peloponnesian War	431
Death of Pericles and Anaxagoras	428
Death of Socrates	400
Rome taken by the Gauls	385
The Death of Plato	348
Alexander destroyed Thebes	335
Alexander built Alexandria	332
Alexander died at Babylon	324
Aristotle and Demosthenes died	322
Praxiteles died	288
The Alexandrian Library founded	283
The Death of Epicurus	270
The First Punic War	264
End of the First Punic War	242
Romans conquered all Italy	226
The Battle of Cannæ	216
The Death of Archimedes	212
Jerusalem taken by Antiochus	170
Persius defeated	167
Judas Maccabeus flourished	166
The Last Punic War	149
Carthage destroyed	146
Death of Tiberius Gracchus	133
Athens taken by Sylla	86
Sylla perpetual Dictator	82
Syria conquered by Pompey	64
Cæser landed in Britain	55
Gaul conquered	51
Cæsar made Dictator	49
Pompey killed	47
Cæsar killed	44
Cicero killed	43
Battle of Actium	31
Death of Horace	8
Birth of Christ	0

The year of the Flood is taken after Usher and Blair, but the Septuagint makes it 3426, Josephus 3146, the Samaritan 2998, and the modern Jews 2104. Herodotus and the Greeks notice none of these Jewish periods, but they mention a deluge in Attica, in the reign of Ogyges, in 1764, 500 years after the other; and various notices are taken of a deluge 250 years afterwards in Thessaly, when Deucalion fled to Athens.

There is also some uncertainty about the epoch of the birth of Christ, and whether he was crucified in the 15th, 16th, or 19th year of Tiberius. The early fathers assigned but one year to the period of his public preaching, others two. Eusebius made it three and a half, and if so, he lived till the 19th of Tiberius. The chronology was not enquired into till long after the events.

Death of Augustus	A. C. 14
Death of Ovid and Livy	17

Pilate, Governor of Judea . A. C. 27
Sejanus put to death 31
Jesus Christ crucified 33
Death of Tiberius 37
Claudius succeeded Caligula 41
Claudius visited Britain 43
Nero succeeded Claudius 54
Boadicea defeated 61
Seneca and Lucan put to death 65
St. Peter and St. Paul put to death 67
Galba succeeded Nero 68
Otho succeeded Galba, and Vitellius Otho 69
Jerusalem taken and destroyed 70
Titus succeeded Vespasian 79
Pliny killed at Vesuvius 79
Domitian succeeded Titus 81
The Dacian War began 88
Death of Josephus 93
Nerva succeeded Domitian 96
Trajan succeeded Nerva 98
Death of Tacitus 99
St. Ignatius destroyed at Rome 108
The first Bishop of Rome 109
Trajan subdued Assyria 115
Jerusalem rebuilt, and the Temple dedicated to Jupiter 130
The Romans destroyed 580,000 Jews, and banished the rest from Judea 135
The Romans agreed to pay tribute to the Goths 222
The Temple of Diana at Ephesus destroyed 260
The Goths and Heruli defeated by Claudius II., and 300,000 killed 269
The 9th persecution of the Christians 272
Palmyra taken 273
Dioclesian divided the empire 292
Constantine tolerated the Christians 323
The Council of Nice 325
Constantinople made the capital of the Empire 329
The Mythological Temples demolished 331
Death of Constantine 337
Death of Ensebius 342
The Emperor Julian abjures Christianity 361
Theodosius Emperor of the East 379
His Death 395
Europe overrun by Alaric 401
Rome sacked by Alaric 410
The Romans left Britain 426
Genseric, the Vandal, overran Italy, and invaded Africa 439
Pope Leo the Great 440
Attila and the Huns overran Europe 447
The Saxons arrived in Britain 451
Rome taken by Genseric 455
Hengist murdered 300 British nobles 475
Rome taken by Odoacer, who was made King of Italy, which put an end to the Roman Empire 1229 years after the building of Rome 476
Clovis, King of the Franks 481
Death of St. Patrick 491
The Bishop of Rome asserted his supremacy 494
Alaric defeated and killed by Clovis 507
Arthur, King of Britain 515
The Christian Æra invented and introduced by Dionysius, a monk 516
Justinian made Emperor of the East 527
Totila, the Goth, took and plundered Rome 547
Retaken by Belisarius 549
And recovered by Totila 550
The Heptarchy begun in England 555
Death of Justinian and Belisarius 569
The Latin tongue ceased to be spoken 589
The flight of Mahomet from Mecca to Medina 622
Death of Mahomet 633
Jerusalem taken by Omar 636
The Saracens conquered Northern Africa 698
Spain conquered by the Saracens 713
The Christian religion propagated in Germany 719
Charles Martel defeated the Saracens 732
The Christian Æra first used in books 748
Bagdad built by Almanzor 762
Charlemagne King of France 772
——— subdued the Saxons 781
The Huns extirpated by Charlemagne 794
Charlemagne crowned at Rome 800
The Normans arrived in France 808
Death of Charlemagne 814
The Heptarchy united by Egbert 827
Rome besieged by the Saracens 846
Christianity preached in Denmark and Sweden 850
The Danes ravaged England 867
Alfred defeated the Danes 878
Death of Alfred 901
Rollo flourished in Normandy 912
Sueno King of Denmark 980
Sueno conquered England 1013
Canute King of England 1017
Macbeth murdered Duncan 1040
The Turks took Bagdad, and overturned the Empire of the Caliphs 1055
The Battle of Hastings, and Norman Conquest 1066
Feudal Law introduced 1070
Doomsday-book finished 1086
First Crusade 1095
Jerusalem taken by the Crusaders 1099
William Rufus killed in the New Forest 1100
Death of Abelard 1143
The Second Crusade 1147
The Bank of Venice established 1157
Becket killed at Canterbury 1171
Ireland conquered 1172

Jerusalem taken by Saladin	1187
Saladin defeated by Richard I.	1192
The Fourth Crusade	1202
The Inquisition established	1204
King John excommunicated	1208
Magna Charta signed	1215
Russia conquered by the Tartars	1238
The Fifth Crusade	1248
Wales conquered	1254
Bagdad taken by the Tartars, and the Saracen Empire terminated	1258
The first English House of Commons	1258
Massacre of the French in Sicily	1282
Wales united to England	1283
Death of Friar Bacon	1284
The Jews banished from England	1290
Death of Cimabue, the reviver of painting	1300
The King of France excommunicated	1301
The Popes removed to Avignon	1308
Battle of Bannockburn	1314
Battle of Cressy	1346
Battle of Poictiers	1356
The Popes returned to Rome	1377
A Second Pope chosen at Avignon	1378
Death of Wickliffe	1385
France under a Papal interdict	1407
The Council of Constance deposed two Popes	1414
John Huss burnt	1415
Jerome of Prague burnt	1416
Joan of Arc defeated the English at Orleans	1428
Constantinople taken by the Turks	1453
Battle of Towton	1462
Battle of Barnet	1471
Battle of Tewkesbury	1471
Castile and Arragon united	1479
Battle of Bosworth	1485
The Moors expelled Spain	1491
Cavanarola burnt at Rome	1498
Battle of Flodden	1513
Luther began to preach	1517
Mexico invaded and plundered	1521
Battle of Pavia	1525
Rome taken by the Germans	1527
Servetus burnt by the Reformer Calvin	1531
The Pope's authority in England abolished	1533
645 monasteries and religious houses suppressed in England	1539
The Council of Trent from 1545 to	1563
Cardinal Beaton put to death	1546
Interest fixed at 10 per Cent. in England	1547
Eldest sons of Peers permitted to sit in the House of Commons	1550
Five Bishops burnt by Philip and Mary	1555
Charles the Fifth resigns his government	1557
Death of Calvin	1564
Rizzio murdered	1566
Murray murdered	1569
Massacre of St. Bartholomew	1572
Death of Knox	1572
Republic of Holland commenced	1579
Mary Queen of Scots put to death	1587
The Spanish Armada defeated	1588
The first newspaper in England	1588
Bank of England incorporated	1594
Edict of Nantes tolerating Protestants in France	1598
East India Company established	1600
Union of England and Scotland	1603
Gunpowder Plot	1605
Spain acknowledged the independence of Holland	1609
Henry IV. of France assassinated	1610
Shakspeare died	1616
Vanini burnt at Toulouse	1619
Death of Cervantes	1620
Hugonot, or religious war in France begun	1621
Death of Lord Bacon	1626
Buckingham assassinated	1628
Nine Members of the House of Commons imprisoned	1629
Bagdad taken by the Turks	1631
Battle of Lutzen	1632
Hampden's trial in the Exchequer	1637
Lord Strafford beheaded	1641
Massacre in Ireland	1641
Battle of Edgehill	1642
Death of Galileo	1643
Archbishop Laud beheaded	1644
Death of Hampden	1644
The Tartars overran China	1644
Battle of Marston Moor	1644
Battle of Naseby	1645
Charles I. delivered up by the Scots	1647
Peace of Westphalia	1648
Charles I. beheaded	1649
Battle of Dunbar	1650
Death of Des Cartes	1651
Battle of Worcester	1651
War of England and Holland	1652
The English Fleet defeated	1653
Cromwell dissolved the Long Parliament, and made Protector	1653
Death of Gassendi	1656
Death of Harvey	1657
Death of Cromwell	1658
Charles II. restored	1660
Prussia independent	1663
Great Plague in England	1665
Great Fire of London	1666
Candia taken by the Turks	1669
Murder of the De Witts	1672
Death of Milton	1674
The Habeas Corpus Act passed	1678
Lord Russel and Algernon Sydney put to death	1683
Death of Colbert	1684
The Edict of Nantz revoked	1685
Battle of Sedgmoor	1686
Seven Bishops sent to the Tower	1686
Revolution in England	1688
Battle of the Boyne	1690
The French Fleet defeated the English and Dutch	1691

Surrender of Limerick	1691
Battle of La Hogue	1692
Hanover made an electorate	1692
The English funding system commenced	1694
Treaty of Ryswick	1697
Battle of Narva	1700
Death of James II.	1701
Gibraltar taken	1703
Battle of Blenheim	1704
Barcelona taken	1705
Battle of Ramilies	1706
Battle of Almanza	1707
Battle of Oudenarde	1708
Battle of Pultowa	1709
Battle of Malplaquet	1710
Treaty of Utrecht	1713
The interest of money in England fixed at 5 per cent.	1714
Louis XIV. died	1715
Death of Leibnitz	1716
Charles XII. killed	1718
The Mississippi Bubble	1719
The South-Sea Bubble	1720
Death of Peter the Great	1725
Death of Newton	1727
Kouli Khan made King of Persia	1736
—— conquered the Mogul Empire	1739
Porto Bello taken	1740
Battle of Dettingen	1743
Anson's Voyage completed	1744
Battle of Fontenoy	1745
Battle of Culloden	1746
Kouli Khan murdered	1747
Lord Lovat, &c. beheaded	1747
Peace of Aix-la-Chapelle	1748
Braddock defeated	1755
Battle of Colin	1757
Battle of Hockkerken	1758
Louisburgh taken	1759
Battle of Minden	1759
Quebec taken	1759
Havannah taken	1762
Treaty of Fontainblean	1763
Wilkes's first election for Middlesex	1768
Do. second and third	1769
The Shakspeare Jubilee	1769
Peace with Hyder Ally	1770
Partition of Poland	1772
Commencement of the American War	1775
Declaration of American independence	1776
Meeting of Deputies at London for Parliamentary Reform	1780
Recognition of American independence	1782
Call of the States-general in France	1788
Taking of the Bastile	1789
French Republic proclaimed	1792
Louis XVI. guillotined	1793
French declaration of war against England and Holland	1793
Robespierre guillotined	1794
The Bank of England suspended its payments in cash	1797
Bonaparte made Consul	1799
Battle of Marengo	1800
Peace of Amiens	1802
War renewed	1803
Bonaparte crowned Emperor	1804
Battle of Austerlitz	1805
Battle of Trafalgar	1805
Battle of Jena	1806
Battle of Friedland	1807
Peace of Tilsit	1807
Napoleon seized Ferdinand	1808
Battle of Wagram	1809
Marriage of Napoleon with Maria Louisa	1810
Moscow burnt, and the French armies destroyed by frost	1812
Battle of Vittoria	1813
Battle of Leipsic	1813
Paris surrendered to the Allies	1814
Treaty of Fontainebleau	1814
Treaty of Vienna	1814
Napoleon returned from Elba	1815
Battle of Waterloo (June 18)	1815
Napoleon surrenders to the Bellerophon	1815
Treaty of Ghent, between England and America	1819
Tragical assault of petitioners at Manchester	1819
Republic of Columbia proclaimed	1819
Do. Peru, Chili, and Mexico	1820
Death of Napoleon	1820
Death of George III.	1820
Trial of Queen Caroline	1821
War of Russia and Turkey	1829
Catholic disabilities removed	1829
Death of George IV.	1830
Counter Revolution in France, and Charles X. expelled	1830
Poland conquered, and united to Russia	1831
The Bill for Parliamentary Reform passed	1832

DISCOVERIES.

1345 The Canaries.
1418 Madeira.
1432 The Azores.
1486 Cape of Good Hope.
1492 America.
1673 Louisiana, by the French.
1686 Easter Island, by Roggewein.
1690 Kamschatka, by the Russians.
1770 New South Wales, discovered by Cook.
1771 Sandwich Islands, by do.
1774 New Caledonia, by do.
1819 New South Shetland, by Williams.

The Icelanders discovered the Continent of America about 1000, and called it Winenland, from the vines in which it abounded.

The South Sea was first seen by Europeans in 1513 from Mexico.

Japan was discovered in 1542.

Cape Horn was discovered by Le Maire and Schouten in 1616.

The discoveries on the North-west

Coast have extended from east to west to 149½ west, and from west to East to 156⅓, leaving 7 degrees in latitude 74 unexplored, or 140 miles.

Dates connected with the progress of knowledge and improvements since the Christian era.

274 Silk brought from India.
373 The Bible in Gothic.
400 Bells mounted.
493 Silk-worms in Europe.
660 Organs used.
603 Glass in England.
800 The Aristotelean Philosophy introduced.
830 Oxford University.
991 The Arithmetical Digits.
1080 Domesday Book.
1124 Musical Notes.
1200 Mariner's Compass.
1220 Astronomy cultivated in England.
1230 Cnals dug as fuel.
1299 Spectacles invented.
1302 Cambridge University.
1319 Dublin University.
1341 Petrarch crowned at Rome.
1360 Wickliffe flourished.
1436 Printing invented.
1454 University of Glasgow founded.
1464 Posts and diligences established.
1470 The first Almanac.
1471 Printing in England.
1517 Luther began to publish.
1543 Copernican System published.
1549 Telescopes invented.
1602 Decimal arithmetic.
1604 Satellites of Jupiter seen.
1614 Logarithms invented.
1619 Circulation of the Blood.
1623 Barometer invented.
1662 Royal Society established.
1682 Philadelphia founded.
1680 Air-pump discovered.
1710 Newcomen's Steam-Engine.
1716 Death of Leibnitz.
1720 Inoculation introduced.
1722 Electricity improved.
1726 Petersburgh Academy established.
1730 Fahrenheit's Thermometer.
1730 Gottingen University established.
1753 British Museum established.
1768 Steam-Engines improved.
1771 Cook's First Voyage.
1773 Cotton-spinning Machinery.
1774 Oxygen discovered.
1778 Linnæus died.
1779 Hydrogen discovered.
1784 Euler died.
1788 Galvanism discovered.
1789 Anatomic Theory suggested.
1797 Priestley died.
1798 Vaccination announced.
1781 The planet Herschel discovered
1804 Gas lights introduced.
1813 Steam boats invented.
1820 Macculloch's new roads.
1830 La Place, Davy, Young, and Wollaston died.
1832 Cuvier died.

The past history of London records 16 visits of contagious pestilences in England. In 762, 1025, 1247, 1347, 1367 1379, 1477, 1499, 1548, 1594, 1604, 1625, 1631, 1032, and 1665, averaging 73 years between each. Some change in the proportions of the constituents of the atmosphere, affecting various artificial constituents, is the presumed cause.

The "*beginning*" of Moses is a sublime indefinite, and all the stages of the earth, from the granitic formation, the transition rocks, and all the secondary strata, may have occupied millions of years in progressing to their present state from the beginning of Moses.

The Hindus have no civil chronology, but their epochs are astronomical and theological. They record fifty-five sovereigns of the Sun before the Christian era, which Sir W. Jones extends through a period of 1600 or 2000 years. But the priests make nine incarnations of Vishnu at very distant periods of time; and the astronomers have observations several thousand years old, displaying a perfection of science, of instruments, and various knowledge, which indicates ages of preparation. Their astronomical cycles are, of course, mere abstract calculations, and their reference to a standard position in Aries fanciful; while the discovery of Herschel, four small planets, and seventeen moons, render their vast calpa futile.

The 50 past calpas, 6 manwanteras, 27 yugs, and the satya of the 28th, with the sandya at the beginning of the calpa, make a total of past time of 1070784000 years, in which Brahma was 17064000 years in creating, after which the planetary motions commenced. A point gravely asserted!

The maya-yug of 4320000 years is divided into the satya yug of .4, the treta of .3, the dwaper of .2, and the cali-yug of .1.

At the close of each manwantera, of 71 maha-yugs, there is, say they, a period equal to a satya-yug of universal deluge, of 1728000 saura-years. This, in principle, accords with the editor's theory, but the time is fanciful; though one sect of Brahmins assert a period of deluge equal to 20,000 years, and at the same intervals.

There are 57753.336 lunations in a maha-yug, and 1577917828 days from sun-rise to sun-rise; which gives 29d. 12h. 44′ 2″ 47‴ 36⁗ for a mean lunation, and 365d. 15h. 31′ 31″ 24‴ for the length of a year, and all other periods are equally precise. The moon's apogee and nodes have increased four revolutions in a yug since these tables were formed. The obliquity was then taken at 24°.

MONEY AND COINS.

Whatever represents property, and is portable, is called Currency. When currency is abundant or cheap, property is high or dear in currency; and when less in amount, property is cheap in currency. Paper is a better and more convenient social currency, if secured, and of steady amount, than the precious metals; and among different nations, any commodity which one possesses and the other wants, is equivalent to the commodity of gold or silver, for payment and exchange.

Silver was first coined by Phidon, king of Argos, about 860, the epoch of the building of Carthage, and about 140 years after the building of Solomon's temple.

The most ancient known coins are of the fifth century B. C. and are Macedonian; but others are believed to be more ancient. After that date they illustrate history, but not earlier. They are of gold, silver, copper, or brass. Few give dates, and, therefore, they are more curious as relics than useful as records.

Among discoveries of ancient coins, 60,000 Roman ones were once found at Modena. 40,000 gold Greek coins were found in a river in Transylvania, 30,000 Roman coins were found near Brest; and 600 lbs. of silver coins were found in Sicily. Pots full are often found in Britain.

The drachma of the Greeks was a silver coin of the eighth of an ounce, worth *9d.* The sestrice of the Romans was about *2d.*, and was of silver and brass, or brass only, marked J. J. S. A talent among the Greeks was 1000 drachmas. On the Roman coins the date is the name of the consul or emperor; and among the Greeks the name of the Archon or king. In Italy, France, and Asia Minor, there are modern manufactories of ancient coin to supply the antiquaries; just as in most countries there are imitators of ancient pictures to supply the amateurs.

The Greek coins still extant are in variety about two thousand.

A pound of gold was, by the Romans, divided into a coin called Aureus, of 40, 45, and 72 to the pound.

A pound of silver into 100 denarii. The sestertius was nearly *2d.* the denarius $7\frac{1}{2}$*d.*, the aureus 16.1$\frac{3}{4}$.

Among the Greeks, an obolus was three halfpence; a drachma, *9d.*; a mina, *3l. 15s.*; a talent, *225l.*

The silver tetra-drachm of Athens was current as the Spanish dollar of our times.

The most ancient Jewish coins represented a pot of manna on one side, and Aaron's blossoming rod on the other: the inscriptions were in Samaritan characters. A Jewish talent was 3000 schekles, of *2s.* $3\frac{3}{8}$*d.* each. The coins mentioned in the New Testament are the Roman denarius, value $7\frac{3}{4}$*d.*; the as, $3\frac{1}{10}$*d.*; and the assarium, a farthing, or mite.

In Greece, silver was to gold as 15 and 10 to 1; in Rome, as 12 and 7 to 1; till Columbus, as 12 and 10 to 1; and in modern Europe, as 17 and 14 to 1. The mines produce 52 lbs. of silver for 1 of gold.

Humboldt estimates that America transmits seven or eight millions of gold and silver annually to Europe, half of which is exported to the East, an eighth coined, and the rest in plate and jewellery.

A talent of gold was worth *5475l.*, and a talent of silver *342l. 3s. 9d.*

The Saxons coined silver pennies and copper sticas, or half-farthings. The silver penny weighed $22\frac{1}{2}$ grains; but in the time of Elizabeth it had dwindled to less than one-third: silver halfpennies and farthings were in use from 1280 to 1560, and groats and half-groats. The first shillings were coined by Henry VII. and were called testoons. Half-crowns, sixpences, and threepences were coined by Edward VI.

Athelstan, in 928, first established uniform coin in England; and, after that time, the kings became the bullion merchants and coiners. In the reign of Henry III., the king's profit, or seignorage, was *6d.* in the pound. Edward I. raised it to *1s.* $2\frac{1}{4}$*d.*, of which $3\frac{1}{2}$*d.* was cost; but importers of bullion, since the reign of Charles II., have been exempt from charge for coining.

Gold coin was introduced by Edward III. in six-shilling pieces, nearly equal in size to a modern sovereign. Nobles followed at *6s. 8d.*, and hence the lawyer's fee: afterwards there were half and quarter nobles. Edward IV. coined angels, with a figure of Michael and the dragon, the origin of George and the dragon. Henry VIII. coined sovereigns and half-sovereigns of the modern value. Guineas were the same size; but being made of superior gold from sovereigns, guineas passed for *21s.* and afterwards at *30s.*

Henry VIII., in the latter years of his reign, debased the silver coin to half alloy, and, finally, to two-thirds alloy. It lowered the value of money with relation to goods, producing great confusion; and the restoration was the anxious care of years of Edward and Elizabeth. George III. substituted paper for metal; and then his Son passed suddenly

to metal again, and ruined the entire generation.

There was coined in the entire reign of George III. in gold, to the value of 71,649,213*l.* and in silver 4,306,120*l.* of which fourteen millions were coined in 1816 and 17.

In England, a pound of gold is coined into 44½ guineas, or 46 29/40 sovereigns, of 5 dwts. 3 grs. 171/623; and of silver into 66 shillings, of 8 dwts. 15 grs. 3/11. The standard price of gold being 3*l.* 17*s.* 10½*d.* per oz., and of silver 5*s.* 6*d.*

The English Mint has eight presses, which strike 60 blows per minute, and produces 3,600 coins an hour, for 10 hours, or, at least, 30,000 per day, making 240,000 for the 8 presses. Good steel dies take 3 or 400,000 impressions.

The Royal Mint is conducted by a master, warden, deputy, comptroller, assayers, melters, weighers, clerk of the irons, engravers, &c. &c.

The Royal Mint, in England, was established in the 18th of Edward II., under the direction of a master, warden, comptroller, assay-master, and king's clerk, with subordinate officers.

The gold coin brought into the Mint from Great Britain and Ireland, by the proclamations in 1773, 1774, and 1776, were:—

First proclamation brought in 3,806,435*l.* 7*s.* 2*d.*; deficient, on the average, more than 6 grains in a guinea.

Second proclamation brought in 4,876,171*l.* 18*s.* 3*d.*; deficient between 3 and 6 grains.

Third proclamation brought in 6,980,986*l.* 5*s.* 3*d.*; deficient between 1 and 3 grains.

Total, 15,563,593*l.* 10*s.* 8*d.*

In 1800 and 1821, gold bullion was 3*l.* 17*s.* 10½*d.* per oz.; but, in 1813, it rose to 5*l.* 1*s.*; and, in 1814, to 5*l.* 4*s.*; in 1815, to 5*l.* 11*s.*, by which the currency was depreciated 23*l.* 18*s.* 25*l.* 2*s.* 6*d.* and near 33 per cent.

The average Mint proportions of silver to gold is 15½ to 1.

The mark of the Goldsmith's Company is by letters, from A to U, which began in 1796; so that 1837 it will be U.

In 500 years our silver coinage has been reduced in value as 99 to 32, and gold as 3.5 to 1. In France and Spain the reduction of silver coinage has been as 17 to 1.—*Kelly's Cambist.*

Silver is a legal tender only for 40*s.*

Alloy of gold is silver and copper, and of silver is copper. Standard gold is two carats of alloy to 22 of fine gold, making a pound troy. Standard silver is 18 dwts. of copper to 11 oz. 2 dwts. of fine silver.

A grain of gold is 20 mites, and a mite is 24 droits; a droit is 20 periots, and a periot is 24 blanks: used in weighing precious stones.

Irish money of account is taken 12-13ths British, or as 48 to 52. 8¾*d.* or 35 farthings, Irish, is therefore 8¼*d.* British. 3*d.* Irish is 2¾*d.* British; 6*d.* is 5½*d.*, 10*d.* is 9¼, and 11½*d.* as 10½*d.*, per 6th George IV. cap. 79.

Currency in the West Indies is imaginary money, which varies against sterling from 40 to 100 per cent. In consequence, the dollar in Jamaica currency is 6*s.* 8*d.*, at Barbadoes 6*s.* 3*d.*, and at other islands 8*s.* 3*d.* and 9*s.* The doubloon at Jamaica, currency being 140*l.* to 100*l.*, is 5*l.*; pistole 1*l.* 5*s.*, joe 5*l.* 10*s.*, guinea 1*l.* 12*s.* 6*d.*; bits, or reals, are 7½*d.*

Silver is a tender in the British colonies. Treasury bills pass for 103*l.* of silver. A Spanish dollar, in the British colonies, is a tender for 4*s.* 4*d.*

In other parts of Europe our ratio between gold and silver does not prevail; and gold is from four to ten per cent. less valuable than silver: except at Malta, where the scudo is valued in silver at 22.60, and in gold at 23.34; but at Antwerp the Flemish pound is valued in silver at 131.1, and in gold at 123.87.

The Saxon silver coins were shillings, thrimsas, pennies, halflings, and feorthlings; their brass coin was a styes.

The circulation or currency of England in 1824 was as under:—

Bank Notes	21 millions.
Country Notes ...	12½ millions.
Silver and gold .	10 millions.
	43½ millions.

The currency in 1832 was

Bank Notes	18 millions.
Country Notes ...	5½ millions.
Gold and silver .	8 millions.
	31½

The difference is about 25 per cent.; and to this extent all property has fallen in money value, while the moral effect has reduced it 30 or 40 per cent., and articles not of the first necessity from 60 to 75 per cent. profits *nothing* in falling markets.

The highest and lowest amount of bank-notes and bills in circulation in the following years were—

1816	28,348,430	25,006,330
1817	30,920,360	23,412,820
1818	30,529,731	24,789,690
1819	28,354,091	22,194,650
1820	20,384,894	22,048,240
1821	25,722,892	17,375,662
1822	20,764,268	16,642,042
1823	21,770,666	16,379,531
1824	23,004,244	17,230,799

1825	25,709,526	17,464,890
1826	26,104,904	19,031,617
1827	23,845,916	18,303,470
1828	22,949,462	19,091,052
1829	21,807,947	17,792,384
1830	22,612,106	17,853,060
1831	20,399,392	16,704,594
1832	19,470,453	16,495,053

The lowest amounts are always in the two last weeks of December or first of January. But before the Panic, the lowering had taken place *in November;* in three weeks of which the amount had been but 17½ millions; and this experiment on credit was ***the sole cause*** of the Panic. Afterwards, the issues in three weeks were raised to 26 millions odd, but nothing could then bring the dead to life. Credit had been destroyed, and the liberal interference of Government was required; but power was in the hands of fools or knaves.

Country notes were estimated, per stamps, in 1814, at 22¼, in 1818 at 20 millions, in 1824 at 12¾, and 1825 at 15 millions. These, in 1826, fell to 8½ millions; and, in 1829, were but 8,130,327*l.*, which may be taken at two-thirds in calculation. The gold coined in 16 years, 1814 to 1829, was 44,332,130*l.* or 2¾ millions per annum. The stamp-duty on bills of exchange was from 7 to 800,000*l.* from 1814 till the Panic, and since it has varied from 5 to 600,000*l.* This indicated an amount of 85 or 95 millions, and 60 or 70 millions in circulation, supposing every bill to be renewed four times in the year.

One-third the gold is supposed to be exported, one-fourth melted for manufactures, and one-third hoarded, leaving one-twelfth, or 3¾, for currency.

The issues of bank-notes always increase from 2 to 4 millions at the four quarterly dividends, and of country bankers' notes at the periods of the excise and assessed taxes collections.

The ablest writers agree that the income of a people ought to be four times the amount that is drawn from them in taxes; and this depends on the facility of transactions by sufficient currency. If the taxes are 50 millions, the income ought to be 200; and taking profits at 10 per cent., this demands 2000 millions of transactions, with a sufficient currency to meet them.

It was, in 1825, computed that there were 100 millions of bills of exchange and promissory notes in circulation, the time and credit on which facilitated transactions. In 1829 they were believed to be reduced to 50 or 60 millions.

Owing to the abrupt abstractions of the currency, and the destruction of credit by the *accident* of the Panic of December, 1825, by which all the élite of our manufacturing and commercial system were either paralysed or utterly destroyed, the revenue has progressively declined, while the reduced amount presses with aggravated severity on the whole community. It is believed, that the loan of 3, 4, or five millions to the trading community at or after the Panic, would have averted these mischiefs, prevented the dispersion of the people, and the consequent transfer of their superlative skill to rival nations. The rapid decadence of the country is therefore to be solely ascribed to ignorance and pride in ministers, to the folly of systems of political economy, and to a rancorous jealousy, in large numbers of the aristocracy, of the growing ascendancy of the commercial interests.

The paper currency, which commenced after the revolution of 1688, facilitated the means of lending and borrowing, and then kept pace with those practices. Hence credit and promising enterprises became capital; and debts and mortgages appertained to every thing at the Panic, being several thousand millions. Ignorant ministers did not understand this, and they assisted in cutting off the hair of Sampson!

In the age of Alfred a cow sold for 5*s.* 6*d.* (now 15*l.*); an ox for 7*s.* (now 25*l.*); a hog for 1*s.* 10½*d.* (now 30*s.*); a sheep for 1*s.* 2*d.* (now 30*s.*) a hide of land, 120 acres, for 1000*s.* (now 3 or 4000*l.*)

At Calcutta, a rupee is 1*s.* 11¾*d.* A sicca rupee 2*s.* 0¾*d.*, and a gold moteur, 16 rupees, is 1*l.* 13*s.* 2½*d.*, gold being 3*l.* 17*s.* 10½*d.* and silver 5*s.* 2*d.* per oz. The current rupee is 2*s.*, or ten to the pound sterling. A lac, 100,000, and a crore 10,000,000. The rupee is 16 oz. and the anna 12 pice; and in cowries, 2560 are a rupee.

Cowries are small shells, found at the Maldives and near Angola, which are the small change in India and Africa. At Boosa, and in Africa, about 5000 pass for a pound.

At Canton, 1000 or 750 cash are 1 tale, about 6*s.* 8*d.* English. The tale is cast 3 of copper and 2 of lead.

The Bombay rupee is 2*s.* 3*d.* A maund, or 40 seers, is 28 lbs. and a thath 18 inches.

A star pagoda is 7*s.* 5½*d.* passing at 8*s.* The Arcot rupee is 1*s.* 11½*d.* of 16 annas, or 192 pice. The gold rupee is 1*l.* 9*s.* 2½*d.*

Chinese money consists of silver and copper. Gold is a mere article of traffic, which passes by weight. Copper is the only coin, in pieces about four-fifths of a penny, called tcheng. The current interest of money is from 12 to 18 per cent.

The only real coin is the tung-tseen, or cash, the rest are imaginary.

10 cash one candareen.
10 candareens one mace.
10 mace one tael, or 138 cents.

The milrea in Portugal is 73.18 pence silver, 67.34 gold.

The ruble of Russia was 40.08 in silver, and 30.35 in gold. The scudo, or crown of Rome, is 55.4 in silver, and 51.63 in gold.

The real of Zante is $4\frac{1}{3}d$.

The lira, in Italy, is, at Florence, Genoa, and Leghorn, $8\frac{1}{3}d$.; at Milan, 8*d*. and 11*d*. at Modena $3\frac{3}{8}d$., at Parma $2\frac{1}{3}d$, at Trieste 5*d*. and in Sardinia 19*d*.

The Spanish piastre is	54 pence
Ditto piece of eight	43.11
The guilder, florin, or twenty stiver piece	20.08
The new louis	190.5
Dutch ducat	112.13
Italian sequin	112.96
Single Frederick	195.42
Gold ruble	26.030
Doubloon	3*l*. 5*s*. 10.03
Pistole	191.35
Turkish sequin	91.11
Silver ruble	38.83
5 Copick pica	2.10

An African ackie is 5*s*.

A franc is valued at 10*d*. A Sicilian dollar at 4*s*. 1*d*. Spanish and American at 4*s*. 4*d*.

Dollars, in America, are divided into 10 dimes, 100 cents, and 1000 mills. The dollar, in the northern states, is 6*s*. currency. In New York and North Carolina 8*s*. In New Jersey, Pensylvania, &c. 7*s*. 6*d*.; and in South Carolina and Georgia 4*s*. 8*d*. A golden eagle is 10 dollars, or sterling 2*l*. 3*s*. 8*d*. Dollars are 4*s*. $3\frac{1}{2}d$. sterling, and cents are 208 grains of copper, the hundredth of a dollar.

A bit is the tenth of a dollar, and a pistareen is 2 bits.

The coin called the mark was 13*s*. 4*d*. and the name mark-lubs is still retained in Denmark, &c. as money of account.

A sou is 5 grammes of copper, and a franc is 5 grammes of silver, with one-tenth of copper.

Rix-dollars have a variety of values. In Switzerland they are from 45 to 50 pence sterling; at Berlin 38 pence—at Bremen, Cassel, Frankfort, 40 pence—at Cologne 33 pence—in Denmark from 47 to 58 pence—in Hanover 41 to 45 pence—at Riga 56 pence—in Sweden 59 pence.

Florins have the following values in different countries:—At Amsterdam $22\frac{1}{8}$ pence—at Antwerp $18\frac{3}{4}$—in Germany $26\frac{3}{4}$—at Geneva $4\frac{9}{10}$—at Munich $22\frac{1}{8}$—at Trieste and Vienna 26.83—at Zurich 25.

The ducat at Florence is 60 pence—at Naples from 41 to 44 pence.

The piastre, or dollar, at Constantinople is 14 pence—at Genoa 49 pence—in Spain 42 pence.

The livre of France is worth 10.16 pence, the franc 10.33—the livre at Geneva is 17 francs.

A stiver of Holland is $1\frac{1}{2}d$. and a guilder 1.9.; a Flemish florin is 1*s*. 8*d*. and a ducat 9*s*. 3*d*.

The Spanish real, according to the value of silver, varies from 3*d*. to 7*d*., which last is Mexican plate; and in gold from $2\frac{1}{2}d$. to 6*d*.

At Cadiz, the dollar is 4*s*. $3\frac{3}{4}d$. & 10.725 reals in a dollar, *i. e*. $4\frac{3}{4}d$. A quinto is the 16th of a real, or a farthing, and a maravedi, or 34th, or half farthing.

The lira of Leghorn is exactly $8\frac{1}{3}$, and the pezza 3*s*. $10\frac{3}{4}d$. The leopold is 4*s*. 6*d*. The 5-line piece 3*s*. 4*d*.

The Turkish piastre is 4*d*., divided into 40 paras. A bag of silver is 500 piastres, and of gold 30,000.

Proportions of the Coin of various Nations to an American Dollar, its cents and thousandths:—

	D.	C.	M.		In Thousandths.
A shilling	0	22	2	...	222
A crown	1	9	0	...	1900
A sovereign, or a pound	4	44	0	...	4440
A guinea	4	88	7	...	4887
A franc	0	18	7.5	...	187.5
A livre tournois	0	18	5	...	185
A marc banco	0	33	3	...	333
A florin, or guilder	0	40	0	...	400
A pistareen	0	16	0	...	160
A rupee	0	50	0	...	500
A Danish rix-dollar	1	0	0	...	1000
A Spanish	1	0	0	...	1000
A ruble	1	0	0	...	1000
A Swedish rix-dollar	1	4	0	...	1400
A milrea	1	24	0	...	1240
A Chinese tale	1	48	0	...	1480
A pagoda	1	84	0	...	1840
A Spanish pistole	3	77	8	...	3778
A moidore	8	0	8	...	8008
A doubloon	14	83	3	...	14,833
A johannas	18	0	0	...	18,000

By means of the last column, coins may be compared in a moment; by multiplying the number of thousands in any one, and dividing by the other. Thus, 35 shillings $\times$ 222 = 7770, which is 7 dollars and 77 cents or rubles, or rix-dollars; or divided 187.5, is 42 francs and 82.5 cents; and so with the rest, varied by the rate of exchange.

Exchange between countries is by equivalent weights of gold or silver. When equal quantities can be obtained at A and B the exchange is at par; when at A the same value can be procured for less than at B, the exchange is in favour of A, and below par at B,

and *vice versa*. The rise above or below par, as bills are scarce or plenty, is according to the debts due from one to the other. If B owes A, and bills are plenty at A, the exchange at A falls on B, and the contrary; so that the course of exchange shows, generally, the balance of trade.

The rate of Exchange between England and Holland, is pounds for florins and stivers.

—— and Paris and France, in francs and centimes.

—— Petersburgh, by the value of the ruble in pence.

—— Austria, in florins and creutzers,

—— Spain, by pence for the dollar of exchange.

—— Italy, by pence for the pezza.

—— Naples, by pence for the royal ducat.

—— Portugal, by pence for the milrea.

—— Ireland, by difference per 100*l.*

Eleven Dutch guilders for a pound sterling is the par of exchange with Holland, but it is often more.

Usance is the customary period of drawing between countries. Between Holland, France, and Hamburgh it is a month, Spain and Portugal two months, Italy three. On America and the West Indies the usance is sixty or ninety days after sight. Three days grace are allowed in London and Berlin, six at Amsterdam, and twelve at Hamburgh. Noting is the formal act of a notary; and it becomes a protest when drawn on a stamp, with a full description of the irregularity for foreign correspondents.

The present value of a lease for 1*l.* per annum advantage, at 6 per cent., is, for 7 years 5.58*l.*, 14 years 9.29*l.*, 21 years 11.764*l.*, and 28 years 13.406*l.* For 80 years it is 16 509*l.*, for 99 years 16.61, and for 100 years, 16.617*l.*

The tables of Government annuities are constructed on the principle that women live longer than men. Thus a male of 15 can purchase an annuity of 20*l.* per annum for 411*l.* 5*s.* 10*d.*; but a female of the same age must pay 438*l.* 11*s.* 4*d.* And at 50 a man would pay 272*l.* 17*s.* 1*d.*, but a woman 312*l.* 14*s.* 10*d.*

The present value of an annuity per annum, would be as many times the amount of the annuity, as the figures beneath.

	4 *per cent.*		5 *per cent.*	
5 years . . .	4	45	4	33
10 years . . .	8	11	7	72
15 years . . .	11	12	10	38
20 years . . .	13	59	12	46
25 years . . .	15	62	14	09
30 years . . .	17	29	15	37
40 years . . .	19	79	17	16
50 years . . .	21	48	18	26

Present values of money payable at those times would be redeemable in the same ratio for decrease.

A perpetual annuity would be 25 and 20 times the amount of the annual payment.

An annuity of 2*s.* 11*d.* per annum, accumulating at 10 per cent. amounts in 100 years to 20,000*l.*

By a sinking fund of 1 per cent. at compound interest, a debt may be paid off in 43 years. But a national sinking fund is absurd, because compound interest can only be drawn from a second party, and in a nation there is no second party from whom to draw it.

The number of years which persons may, on an average, live at different ages, from the best tables, is as under:

1 year old	30 yrs.	45 yrs. old	20 yrs.
5	42	50	18
10	40	55	15
15	37	60	13
20	34	65	10
25	31	70	8
30	28	75	6
35	25	80	4
40	23		

Rate of Interest, in even shillings, at different prices of 3 per cent. consols:

$91\frac{1}{2}$ to 93	3*l.* 5*s.*
$90\frac{1}{4}$ to $91\frac{1}{2}$	3*l.* 6*s.*
$87\frac{7}{8}$ to $90\frac{1}{4}$	3*l.* 7*s.*
$87\frac{1}{2}$ to $88\frac{7}{8}$	3*l.* 8*s.*
$86\frac{7}{8}$ to $87\frac{1}{2}$	3*l.* 9*s.*
$85\frac{1}{8}$ to $58\frac{7}{8}$	3*l.* 10*s.*
84 to $85\frac{1}{8}$	3*l.* 11*s.*
$82\frac{3}{4}$ to 84	3*l.* 12*s.*
$81\frac{3}{8}$ to $82\frac{3}{4}$	3*l.* 13*s.*
$80\frac{1}{2}$ to $81\frac{3}{8}$	3*l.* 14*s.*
$79\frac{1}{2}$ to $80\frac{1}{2}$	3*l.* 15*s.*
$78\frac{1}{2}$ to $79\frac{1}{2}$	3*l* 16*s.*
$77\frac{1}{2}$ to $78\frac{1}{2}$	3*l.* 17*s.*
$76\frac{1}{2}$ to $77\frac{1}{2}$	3*l.* 18*s.*
$75\frac{1}{2}$ tn $76\frac{1}{2}$	3*l.* 19*s.*
$74\frac{1}{2}$ to $75\frac{1}{2}$	4*l.* 0*s.*
$73\frac{1}{2}$ to $74\frac{1}{2}$	4*l.* 1*s.*

Higher or lower rates may be estimated from the above, by adding or subtracting.

When the stocks yield 4 per cent., government sell an annuity of 20*l.*, for 10 years, at 163*l.* 10*s.* 3*d.*; for 20 years, 273*l.* 11*s.* 1*d.*; 30 years, for 347*l.* 12*s.* 2*d.*; 40 years for 397*l.* 8*s.* 11*d.*; and, 50 years, for 430*l.* 19*s.* 8*d.*; or for life, at 15, for 362*l.* 14*s.* 8*d.* males; or 383*l.* 11*s.* females; at 30, for 331*l.* 19*s.* 7*d.* males; and 351*l.* 14*s.* 6*d.* females; at 60, for 198*l.* 14*s.* 4*d.* and 229*l.* 6*s.* 11*d.*; and in proportion to price of stocks as above.

MATHEMATICS.

Signs express the relations of quantities: they are of different kinds, as

The sign of *addition*, $+$, called plus, as $a + b$, reads a plus b.

The sign of *subtraction*, $-$, called minus, as $a - b$, reads a minus b, or b subtracted from a.

The sign of *multiplication*, $\times$, as $a \times b$, signifies that a is multiplied by b. Multiplication is also expressed by a full point (.), and by *into*, as $\overline{a+b} \cdot \overline{c+d}$, or $\overline{a+b}$ into $\overline{c+d}$.

The sign of *division*, $\div$, as $a \div b$ signifies that a is divided by b; or in the form of a fraction, $a \cdot \frac{a}{b}$.

: :: : are the signs of *proportion*, as $a : b :: c : d$, signifies that a is to b as c is to d.

The *radical* sign $\surd$, denotes the root of the quantity, as $\sqrt{a}$ is the square root of a, or the cube, biqnadrate, &c., as $\sqrt[3]{a}$, $\sqrt[4]{a}$, &c.; or by fractions, as $a^{\frac{1}{2}}$, $a^{\frac{1}{3}}$, $a^{\frac{1}{4}}$, $a^{\frac{1}{n}}$, for the square, cube, biqnadrate, and nth or indeterminate root of a.

a^{-1}, a^{-2}, a^{-3}, &c. denote inverse powers of a, and are equal to $\frac{1}{a^1}$, $\frac{1}{a^2}$, $\frac{1}{a^3}$, &c.

The sign of *equality*, $=$, as $a + b = x$, or a added to b is equal to x.

The sign of *difference*, $\backsim$, as $a \backsim x$, signifies either $a - x$ or $x - a$.

$\neg$ is put between two quantities, to express that the former is greater than the latter, as $a \neg b$, as a more than b; $\angle$ signifies the reverse, as $a \angle b$, as a less than b.

A *Vinculum* is a line drawn over several quantities, signifying that they are to be taken collectively, as $\overline{a - b + c} \times \overline{d - e}$ signifies that the quantity represented by $a - b + c$ is to be multiplied by $d - e$; so of the powers and the roots of quantities; thus, $\overline{a+b}|^2$ denotes the square of $a + b$ as one quantity, and $\overline{a+b}|^3$ the cube.

$\therefore$ or $\because$ signifies *ergo*, or therefore.

In calculations, lines or single dimensions can only be compared with lines; superfices or double dimensions with superfices; and cubes or treble dimensions with cubes.

Quantity of matter in cubes is detected only by relative momenta, as in the varied momenta of weight, the varied reaction of resistance, in the same medium, &c.

There is no ratio between finites and infinites, all finites having the same indeterminate ratio to the mere creation of the mind called infinity; therefore all knowledge is strictly limited to the ratios of finites.

All momentum is quantity of matter multiplied into velocity; and momentum or power is evidence of matter and velocity acting in the direction of the resulting momentum.

Geometry is connected with mechanics *solely* because the rectangle of quantity and velocity is always equal to force or momentum.

The sign $-$ always means subtraction and never *negation* or less than nothing. It is relative, not absolute, for there are no negative quantities in nature, and of course none in proper mathematical expressions.

The results of mathematical analysis depend always on the data. Analysis applies the data, or any data, but it proves nothing as to the data, which is either some presumed fact or theory, and may be true or false. It merely determines certain conditions and consequences of the data assumed; but in the determination does not prove the truth of the data, for the analysis is an *abstract* enquiry founded on the data. It is necessary to proclaim this truism in form, because the French and other modern mathematicians often infer the truth of the data from the subtilty of their analysis, forgetting that the same subtilty would equally well illustrate any data.

The differential calculus of Leibnitz finds a small quantity, which taken an infinity of times is equal to a required quantity; and fluxions consider momenta as quantities. One is expressed by d, as $d\,x$, and the other by a dot, as $\dot{x}$.

Fluxions were an invention of Newton, and at the same time and independently Leibnitz invented the differential calculus. It is thus in almost all new inventions knowledge advances to a certain point, and then several make the next step at the same time. Newton's invention is however laid aside, and the differential calculus preferred by all modern mathematicians.

The branch of mathematics called Conic sections arises from the varied curves which a cone produces when cut in different directions. Cut obliquely it is an *ellipse*; cut parallel to one side it is a *parabola*; and when not parallel, but from the side through the base, is called an *hyperbola*. The ancient mathematicians exhausted the investigation of these figures, and the moderns have been equally industrious.

The longer **axis** of an ellipse is called the transverse axis; the distance of either focus from the centre of the transverse axis is called the eccentricity; the axis drawn through the centre at right angles to the other, is called the *conjugate* axis; any straight line passing through the centre is a *diameter*, and any chord to a *diameter* divided equally by it, is called an *ordinate;* the unequal parts of the diameter are called *abscissæ*. A third proportional to a diameter and its conjugate is the *parameter* and *latus rectum*. Conjugate diameters are parallel to each other's tangents. A line which joins either focus to the circumference is called the *radius vector*.

In the *parabola*, the abscissa is a third proportional to the parameter and semi-ordinate. In the *ellipsis*, the square of the semi-ordinate is equal to the rectangle of the parameter and abscissa, less a rectangle of the same abscissa, and a fourth proportional to the axis, parameter, and abscissa. In the *hyperbola* the squares of the semi-ordinates are to each other as the rectangles of the abscissa and a line formed of the abscissa and transverse axis.

The equation of the parabola is $yy = p^x$; and, therefore, the squares of the ordinates are to each other as the absciss.

The equation of the hyperbola is $yy = \frac{bb}{aa}(tx+x^2.)$

The equation of the ellipse is $yy = \frac{cc}{tt}(tx-x^2.)$

The equation of the circle is $yy = dx - x^2$.

These four are curves of the first order, comprised in the general equation $o = a + bx + cy + dx^2 + cxy + fy^2$.

Curves of the second order have, for their general equation, $o =$ as above; adding $+ gx^3 + hx^2y + kxy^2 + ly^3$. And those of the third order, superadding $mx^4 + nx^3y + px^2y^2 + qxy^3 + ry^4$. — x and y being rectangular co-ordinates.

A *catenarian* curve is that formed by a chain, or rope, suspended at both ends. A *cycloid* is the curve formed by a point in a wheel, or body on the earth, which revolves and goes forward at the same time, and that in which all bodies fall. A parabola is the curve formed by water from a pump, or by a stone from a sling.

The head of a fish is a conoid, or the solid form of least resistance.

The cycloid is the curve line of swiftest descent, and is precisely the curve which the double motion of the earth generates in all falling bodies.

Projectiles, independently of resistance, describe parabolic curves.

The word digit, applied to the 10 figures, comes from *digitus*, a finger; computation being, in ancient times, performed by the 10 fingers.

Prime numbers are those which have no divisor; perfect numbers are those which are equal to the sum of all their divisors.

The prime or indivisible numbers under 100 are, 2, 3, 5, 7, 11, 13, 17, 19, 23, 29, 31, 37, 41, 43, 47, 53, 59, 61, 67, 71, 73, 79, 83, 89, and 97.

The convexity of the earth interposes to prevent the sight of distant bodies: thus at 600 yards 1 inch would be concealed, or an object an inch high could not be seen in a straight line; at 900 yards, 2 inches; at 1400 yards, 5 inches; at 1 mile, 8 inches; 3 miles, 6 feet; so that at that distance a man would be invisible; 4 miles, 10 feet; 5 miles, 16 feet; 6 miles, 24 feet; 10 miles, 66 feet; 12=95, 13=112, and 14 miles, 130 feet.

In levelling it is usual to allow the 10th of an inch in every 200 yards, or 8 inches in a mile.

In all horizontal distances, $\frac{1}{13}$th should be added to the distance for horizontal refraction, and Legendre says, $\frac{1}{14}$th. Making this allowance, and remembering that a mile curvates 8 inches, we may determine a distance by knowing the elevation, or an elevation by knowing the distance. By multiplying 8 inches by the square of the distance; thus, if it is 10 miles, 10 times 10 is 100, and 100 times 8 inches is 66 feet as stated; and if the top of a mountain is seen at 50 miles distant, it would be 2500 times 8 inches equal to 1666 feet of elevation, to which adding $\frac{1}{13}$th for refraction it would make the hill about 1800 feet high, therefore 50 miles would be the extent of the prospect from the top.

The dip of the horizon for various heights of the eye is as under, to be deducted.

6 feet	2′ 20″
10 feet	3′ 1″
20 feet	4′ 16″
30 feet	5′ 14″
40 feet	6′ 2″
50 feet	7′ 23″
100 feet	9′ 33″

The refraction of the air for different altitudes is as under, to be deducted. Horizontal 33′

1°	24′ 20″	20°	2′ 35″
2	18 35	30	1 38
3	14 36	40	1 8
4	11 51	50	0 48
5	9 54	60	0 33
10	5 15	75	0 15
15	3 30	85	0 5

The first writer who used algebraic signs was Stifelius, of Nuremberg, in 1544.

The oldest work on algebra is that of Diophantus, who flourished at Alexandria in the 4th century. Its improvers were Vieta, Descartes, Newton, Euler, and La Grange.

The science of probabilities has been extended in modern times by Laplace and other mathematicians, so as to be applicable to questions of all kinds, but it has been for many years applied to calculations of life annuities, and to chances of dice and cards.

It is a general rule that every probability may be expressed by a fraction, the numerator of which should be the number of chances for happening, and the denominator the sum of the number of chances by which it may happen and may fail. But the probability of its not happening is to be expressed by a numerator of the chances of failing, and a denominator consisting of the chances of failing and happening. The two fractions are of course always equal to one. The value of a chance is found by multiplying the fraction, expressing the probability by the stake. The probability of throwing a particular number with one die is therefore 1 for the numerator, 1 and 6 for the denominator or $\frac{1}{6}$th. Then the probability of throwing the same twice is $\frac{1}{6}$th of $\frac{1}{6}$th, or $\frac{1}{36}$th, or 3 times $\frac{1}{6}$th of 36, or $\frac{1}{216}$th.

If A and B game, and A wins in p cases, and B in q cases, and the stake be a, A's chance is $\frac{pa}{p+q}$ and B's chance $\frac{qa}{p+q}$ universally.

The probabilities of throwing required totals with two dice depends on the number of ways in which the totals can be made up by dice. 2, 3, 11, or 12 can only be made up one way each, and therefore the chance is but $\frac{1}{36}$th. 4, 5, 9, 10 may be made up two ways, or $\frac{1}{18}$th. 6, 7, 8, three ways, or $\frac{1}{12}$th the chance of doublets is $\frac{1}{36}$th, the chance of particular doublets is $\frac{1}{216}$th.

The chances against holding 7 trumps is 160 to 1; against 6, it is 26 to 1; against 5, 6 to 1; and against 4 nearly 2 to 1. It is 8 to 1, against holding any two particular cards.

The chance is equal in dealing cards that every hand will have seven trumps in two deals, or seven trumps between 2 parties, and also 4 court cards in every deal. This is so certain on an average of hands that nothing can be more superstitious and absurd, than the prevailing notions about luck or ill-luck. The chance of having a particular card out of 13, is $\frac{13}{52}$uds, or 1 to 4, and the chance of holding any two cards is $\frac{1}{4}$th of $\frac{1}{4}$th, or $\frac{1}{16}$th. The chances of a game are generally inversely as the number got by each, or as the number to be got to complete the games.

There are 36 chances upon two dice. It is an even chance that you throw 8. It is 35 to 1 against throwing any particular doublets, and 6 to 1 against throwing any doublets. It is 17 to 1 against throwing any two desired numbers. It is 4 to 9 against throwing a single number with either of the dice, so as to hit a blot or enter. Against hitting with the amount of two dice the chances against 7, 8, and 9, are 5 to 1; against 10, is 11 to 1; against 11, 17 to 1; and against sixes is 35 to 1.

The number of changes which any number of things, as bells, letters, cards, &c. can produce, is the product of all the figures multiplied together, thus: 1, 2, 3, 4, 5, 6 bells, produce 720 changes.

The 26 letters of the alphabet make 403 quintillians of combinations; 20 make $2\frac{1}{2}$ quadrillions; and 12 would make 479 millions.

On examining Zerah Colborn, the calculating boy, who in a minute or two could give the exact product of five or six figures by five or six, or extract the square or cube-root of eight or ten figures, the following rules about the square-root were elicited:— 1. A square number cannot have an odd number of cyphers. 2. If the last figure is a 4, the last but one will be even. 3. If the last is a 5, the last but one is a two. 4. If the last is odd, the last but one is even. 5. If the last is even, except 4, the last but one is odd. The two last cannot be even, except two cyphers or two fours. More than the three last cannot be the same, unless cyphers or fours. George Bidder, another calculating boy, had invented similar sets of rules.

In a Circle, calling D the diameter, C the circumference, A the area, and P 3.14159.

$$D = \frac{C}{P} \text{ or } \frac{4A}{C}, \text{ or } 2\sqrt{\frac{A}{P}}$$

$$C = PD \text{ or } \frac{4A}{D}, \text{ or } 2\sqrt{PA}$$

$$A = \frac{PD^2}{4} \text{ or } \frac{C^2}{4P}, \text{ or } \frac{DC}{4}$$

$$P = \frac{C}{D} \text{ or } \frac{4A}{D^2}, \text{ or } \frac{C^2}{4A}$$

Lagny carried the ratio of the diameter to the circle to 128 figures, 20 of which are as follows, 3,141592653589 7932384, &c.

The area of a circle whose diameter is one, is equal to a square whose sides are .88622692 : and the square whose sides are 1 is equal to a circle whose diameter is 1.112837917.

To square the circle nearly, for the use of mechanics, draw diameters of the circle at right angles to each other, and produce them each way, beyond the circle, till the produced part of each diameter is equal to one-fourth of the radius; and the four points, when conjoined, form a square nearly equal to the area of the circle.

The proportion of the area of a circle to its circumscribed square, is as 11 to 14.

Tables of sines and tangents, and of natural sines and tangents, are not always accessible; the following proportions between the sides of triangles whose hypothenuse is 1000 for every two degrees, may therefore be useful.

Angle Degrees.	Sine or Perp.	Cos. or Base.
1	17	999
3	52	998
5	87	996
7	121	992
9	156	988
11	191	982
13	225	974
15	259	966
17 ...	... 292 ...	... 956
19	326	946
21	358	934
23	391	920
25	423	906
27	434	891
29	485	875
31 ...	... 515 ...	... 857
33	515	839
35	574	819
37	602	799
39	629	777
41	656	754
43	682	731
45	707	707

For the next 45 degrees they are to be taken conversely, or base and cos. for perpendicular and sine. Intermediate degrees, or parts of degrees, may be found, without material error, by the mean proportional: for example, 55 degrees, ten more than 45, is equal to ten less, or 35 degrees, the base being taken as the perpendicular; and if 36 degrees were wanted, 574 added to 602 is 1176, the half of which is 588, which is the perpendicular for 36 degrees, or the base for 54 degrees, and so the half of 36 and 35 would be $35\frac{1}{2}$° and $54\frac{1}{2}$°.

For the last 10 degrees of the quadrant, the sines are nearly equal parts, the difference per minute in the 81st degree being $287\frac{1}{2}$, and those in the 80th and 90th being 291, hence every sine is merely 291 less per minute in those degrees. For 1 minute, it is 291 and $\frac{291}{60} = 4.85$ is the sine of one second, radius being 1 million, and the multiple of 4.85 is the sine for any number of seconds below a minute; and so for thirds, as to 4.85 if extreme accuracy is required.

The length of any arc of a circle is found by multiplying the degrees in the arc by 3.1416 times the radius, and dividing by 180.

If the square of the diameter of a circle be multiplied by .7854 the product is the area. If the diameter of a sphere be cubed and multiplied by .5236 the product is the solidity; and the square of the diameter multiplied by 3.14159 is the surface of sphere.

The radius of a circle is equal to an arc of 57.2957795 degrees.

To find the surface of a spherical zone multiply the product of the diameter into the height by 3.14159. To find the solidity add the squares of half the two diameters to $\frac{1}{3}$d of the square of the height; multiply this sum by the height and product by 1.5708.

The surface of the segment of a sphere may be found by multiplying the diameter by the height, and this by 3.14159; and the solidity by multiplying the height by .5236; and the product by three times the diameter less twice the height; or to three times the square of half the diameter of the base add the square of the height, multiply the product by the height and this product by .5236.

For the area of spheres or parts, the circumference by the height, whether sphere, zone, or segment.

The solidity of a sphere is $\frac{2}{3}$ds of the circumference by the diameter; or the cube of the diameter by .5236.

A proportion, or ratio of two numbers, is greater or smaller as the quotient of their division is more or less. Thus 6 is to 2 in greater proportion than 6 to 3, because $\frac{6}{2}$ gives more than $\frac{6}{3}$.

If $a : b :: c : d$

Then $a : c :: b : d$.

And $ad = cb$, or $\frac{a}{b} = \frac{c}{d}$

And $a + b : b :: c + d : d$

And $a - b : b :: c - d : d$

If b equal c

Or $a : b :: b : d$,

Then b is a *mean proportional* to a and d.

It is also a *third proportional* to a and ad.

And it has to c, a *duplicate ratio* of a to d.

Then also $ad = b^2$; and b is the square root of ad.

When a is to b as b to c, and c to d, and d to e, then a is a *triplicate ratio* to d, the third term; and a *quadruplicate* to e, the fourth term.

Duple ratio is that of 2 to 1. *Subduple* that of 1 to 2. And *duplicate* ratio is that of the square of one number to the square of another. *Sub-duplicate* is the ratio of the square roots.

Logarithms, so useful in philosophy, are the arithmetical series in contrast with a parallel geometrical series, by which the multiplication of any two terms of one series corresponds with additions of the other. The Logarithms for PRIME Numbers, under 100, are as under, and others are formed from these by mere multiplications and additions:—

2— .301030	43—1.633469
3— .477121	47—1.672098
5— .698970	53—1.724276
7— .845098	59—1.770852
11—1.041393	61—1.785330
13—1.113943	67—1.826075
17—1.230449	71—1.851258
19—1.278754	73—1.863323
23—1.361729	79—1.897627
29—1.462398	83—1.919078
31—1.491362	87—1.939390
37—1.568202	97—1.986772
41—1.612784	

The index is always one less than the number of digits in the whole numbers.

As examples of the use of the above, all the powers of each number are found by multiplying by 2, 3, 4, &c. Thus the Log. of 4 is twice that of 2; of 8 is thrice; of 16 is 4 times; and so on. And the Log. of 9 is twice that of 3, of 27 is three times, &c. So the multiples of any two of the figures have the sum of their Logs. for their Log. Thus $2 \times 7 = 14$, and the Logs. of 2 and 7 added, are the Log. of 14. This short table will, therefore, produce any desired Logarithm of any number.

Neper's and Briggs's Logarithms.

Nos.		Neper's log.		Briggs's log.
1	...	0,000000	...	0,000000
2	...	0,693147	...	0,301030
3	...	0,098612	...	0,477121
4	...	1,386294	...	0,602060
5	...	1,609438	...	0,698970
6	...	1,791759	...	0,778151
7	...	1,945910	...	0,845098
8	...	2,079441	...	0,903090
9	...	2,197225	...	0,954242
10	...	2,302646	...	1,000000

Binary logarithms were invented by Euler to facilitate musical investigations, and 2 is their integer instead of 10 in common, and 1 in hyperbolic logarithms.

The following are Briggs's or the common logarithms for several oft-recurring numbers in calculations.

Log. of the arc of a quadrant 1.57079 = 0.196118.

Of the chord = 0.150515.

Of the circle radius, 1 = 6.288 = 0.798180.

Of the circle diameter, 1 = 3.14 & = 0.497150.

Of the earth's circumference, 24869 = 4.395658.

Of earth's rotation per second at the equator, 1523.9 feet = 3.181957.

Of earth's velocity per second, 98062 feet = 4.991500.

Of distance from sun, 93.027640 miles = 7.968612.

Parallax, 8″.7726 = 0.943129.

Of days in a year = 2.562592.

Of a sec. in a day = 4.935326.

Of moon's fall in her orbit per minute, 128814 feet = 5.109963 (not 16 feet!)

Of the mean fall of a body per second 16.08728 = 1.206492.

Of fall at London 16.0965 = 1.206732.

Of second's pendulum London 39.1393 = 1.592644.

Of the French metre 39.37079 English inches = 1.595173.

Of the imperial gallon 277.274 cubic inches = 2.442919.

The diagonal of a square whose sides are 1, is 1.414 and log. 0,150515.

The circular diagonal of a square or quadrant at arc, radius 1, is 1.57079 and Log. 0.196100.

To find the fall of a body in a second, multiply the square of 3.1416 (9.86962) by the length of the seconds pendulum, and divide by 2.

The length of the second's pendulum is the quotient of twice the fall of a body in the first second, by the square of 3.1416 = 9.86962.

The time of falling through the chord of a circle is equal to the time of descent through the diameter; and through all arcs of a cycloid are equal.

Two pendulums at Paris made 85922.06 and 85933.83 vibrations in a mean solar day. And the same in London gave 85933.29 and 85945.85; 12″ being the increase in London.

A leaden ball fell from the cupola of St. Paul's to the pavement, 272 feet, in 4.25″, which squared, is 18.06; then $\frac{272}{18.06} = 15$ feet per second. But 17 feet being allowed for resistance, it is taken as $\frac{289}{18.06} = 16$ feet per second in air; and as 16.08 in vacuo. A hollow glass globe was 6″ in falling the same height.

The seconds pendulum, in London, is 39.1393 inches; at the equator, 39.027; and 45° is 39.111; and at 75°, is 39.187. The same principle makes it, at the poles, 39.197.

The mean fall of a body in a second is always exactly equal to the quotient of the orbit velocity of the earth, 98062 feet, by 4 times the rotative velocity, 1523.9 feet; *i. e.* $\frac{98062}{6095.6} = 16.08728$ feet.

For other times divide 6095.6 by the square of the times, surfaces rotated being as their own squares to each other.

When the velocity in a latitude is given, multiply it by the cosine and divide by radius, since the inverse force is every where as $\text{rad.}^2 = \cos.^2 + \text{sine}^2$.

Tables of Decimals:—

1*s.* is .05 of one pound.
1*d.* is .0041666 of one pound.
1 farthing is .0010416 of a pound.
1 inch is .08333 of a foot.
1 lb. is .0008928 of an cwt.
1 oz. is .000558 of an cwt.
1 yard is .000568 of a mile.
1 inch is .0000158 of a mile.
1 day is .002739 of a year.
1 minute is .000694 of a day.
1 dwt. is .004166 of a lb. troy.
1 grain is .000173 of a lb. troy.

Decimals of Fractions.

$\frac{1}{2} = .5$	$\frac{1}{5} = .2$
$\frac{1}{4} = .25$	$\frac{2}{5} = .4$
$\frac{3}{4} = .75$	$\frac{1}{7} = .142857$ &c.
$\frac{1}{8} = .125$	$\frac{1}{9} = .1111$ &c.
$\frac{3}{8} = .375$	$\frac{1}{11} = .090909$ &c.
$\frac{5}{8} = .625$	$\frac{1}{12} = .08333$ &c.
$\frac{7}{8} = .875$	$\frac{1}{16} = .0625$
$\frac{1}{3} = .333$ &c.	$\frac{1}{20} = .05$
$\frac{2}{3} = .666$ &c.	$\frac{1}{24} = .041666$ &c.

A mechanical and universal rule of proportion, founded on cross-multiplication, of the products of contrary cause and effect being equal, answering by one direct, easy, and general method, every thing that can be resolved by the direct, inverse, and every way compounded, rule of three.—1. Set down, in the first part of a first line, all the leading terms or conditions of a question, in any order, considered as the first cause, with the word or words of affection thereto; then set down, in the second part of the first line, the following terms or conditions, in any order, considered as the first effect produced by the first cause.—2. Set down, in the first part of a second line, at some distance from, and directly under the terms of the first line, the second like preceding terms or conditions each under each, in the same order with those above them, considered as the second cause, with the same word or words of affection as before; and then set down, in the second part of the same line, the second like following conditions, each under each, in the same order with those above them, considered as the second effect produced by its preceding or second cause; always marking the term sought, in this second line, where it is found deficient, by a star, or asterism.* Put unity for a term only understood.—3. Draw contrary or cross lines; *i. e.* from the terms in the first part of the first line to the terms in the second part of the second line; and from the terms in the second part of the first line, to the terms in the first part of the second line.—4. Multiply the term or terms in the part of the second line wherein the star term is found, (whether in cause or effect,) into the contrary terms in the first line, (standing at contrary ends of the same cross lines) for a divisor.—5. Multiply, also, all the terms together, standing at contrary ends of the other cross line, for a dividend.—The quotient arising from this divisor and dividend, after reducing the fraction to its least or lowest terms, by dividing the dividend and divisor by different equal quantities, will give the true answer in all cases whatsoever. Always state the question so, that the first and third terms given may be of the same name, when the fourth term sought will be of the same name with the second. The rule is, if *more* be required to mark the less extreme, if *less* to mark the greater extreme, for a divisor and to multiply the other terms together for a dividend, when the quotient will be the answer.—*Heath's Palladium*, 1767.

Pyramids are one-third of prisms of equal base and height. They are to each other as their bases and heights. One third of the area of the base by the height is the solidity. The surface is half the product of the length of the base by one of the sides.

The area of a trigon when each side is 1, is 0.433

of a Pentagon . .	1.72
of a Hexagon . .	2.598
of an Heptagon . .	3.6339
of an Octagon . .	4.8284
of a Decagon . .	7.6942
of a Dodecagon . .	11.196

Square the side and multiply by these numbers.

The area of a triangle whose sides only are given, is found by taking half their sum, subtracting each side, and then multiply the half continually by the three remainders, and the square root of that product is the area.

To find the area of a spherical triangle, multiply the difference between the sum of its three angles and two right angles by the radius of the sphere.

To find the area of the segment of a parabola, multiply the base by the length, and take ⅔ds.

For an ellipsis, multiply the product of the two axes by .7854.

For the solid contents of a cylinder, the area of the base by the height. For a cone or pyramid, it is one-third.

A paraboloid is the area of the base by the height and half the product.

A spheroid is the multiple of the fixed axis by the square of the revolving axis, and by .5236.

One link of a surveyor's chain is 7.92 inches, and a chain of 100 links is 22 yards, 10 chains being a furlong, and 80 a mile. 625 links, or 30¼ yards, is a pole or perch, 40 poles is a rood, and 4 roods, or 100,000 links, or 10 chains, or 4840 yards is an acre.

In cross-multiplication 12 fourths is a third, 12 thirds a second, and 12 seconds an inch. Feet into inches are inches, and into seconds are seconds; inches by inches are seconds, and by seconds are thirds; seconds by seconds are fourths.

To find the contents of a cask, add double the square of the bung diameter to the square of the head diameter, and multiply this sum by the length of the cask, then divide the product by 1077 for ale gallons of 282 cubic inches each, or by 882 for wine gallons of 231 cubic inches each.

A standing tree is measured by squaring ¼th of the girth, and multiplying it by the height of the trunk.

The sum of an arithmetical series is found by adding the first and last terms, and multiplying by half the number of terms.

Any term is the first term added to the additional number of common differences. If the first term is 3, and the common difference is 5, then the 12th term is $11 \times 5 + 3 = 58$.

When the first and last are given, any intermediate terms are found by subtracting the two terms, and dividing by one more than the number of terms sought for the common difference. Thus if we want 6 terms between 5 and 40—then $40 - 6 = \frac{35}{6+1} = 5$; and 5, 10, 15, 20, 25, 30, 35; 40 is the series.

Every geometrical series being the continued multiplication by a fixed difference, the terms are, r being the difference a, ar, ar^2, ar^3, &c, to ar^n for n terms. The last term, therefore, is ar^{n-1}, because the first involves no power of r.

The sum of an ascending series is found by multiplying the last term by the common ratio—subtracting the first term and dividing the difference by the ratio less 1.

The sum of a descending series is found by deducting the power of the ratio raised to the number of terms from 1, and dividing the difference by 1 less the ratio, and multiply this quotion by the first term.

And the sum of a descending *infinite* series is found by dividing the first term by 1 less the common ratio.

Numbers whose digits are divisible by 3, are as totals divisible by 3. Numbers of 3 places, in ascending arithmetical progression, are divisible by 3. In like manner any total composed of series in 3, or its multiples 6, 9, or 12, with equal differences, are divisible by 3.

The square of every number, ending with 5 or 0, is equal to 2 square numbers, divisible by 3 and by 4.

A landscape in perspective should not include more than an angle of 60 degrees, or one sixth of the horizon. All lines perpendicular to the picture or perspective plane, vanish in the point of sight, and the size of objects is therefore inversely as their distance.

The *vernier* scale is 11 tenths divided into 10 equal parts, so that it divides a scale of 10ths into 100ths, where the lines meet even in the two scales.

A man five feet six inches high, on the sea-shore, or on level ground, can see about three miles distant.

The hexagonal cells of bees present the greatest space with the least labour. The male cells are invariably 5-18ths of an inch, and female ones 13-60ths, always and every where.

Waves, 39 inches broad, move equal to their breadth in a second, and 2¼ miles in an hour.

A hide of land was 100 or 120 acres, and five was a knight's fee. Domesday-book reckoned 243000 hides in cultivation.

Quincunx is 1 at each of 4 corners, and 1 in the middle.

In the Roman notation, IƆ or D, stood for 500; and C after them, for as many hundreds as C's; CIƆ, or M, was 1000, with C's for odd hundreds.

M, with a dash over it was one million: X, with a dush over it, 10,000. The Ɔ is tenfold the number to which it is added.

An iron shot, of 4 inches diameter, weighs 9 lbs.; and a lead one of 4¼, 17 lbs.; and others to these are as the cubes of their diameters.

To determine the number of fixed atoms in any bulk by their downward tendency, the hydrometer is a very

convenient instrument, and it gives the specific gravity within the 40,000th part. In other cases, on being weighed in and out of water, as the lost weight in is to that out, so is the specific gravity of water to that of the body.

A square foot of *cast* iron, 1 inch thick, weighs 38 lbs. 10.7 ounces; of malleable iron 39 lbs. 13.1 ounces; of copper 47 lbs., and of lead 59 lbs.—Other thicknesses in proportion.

A cubic foot weighs as under:—

Porphyry	*lbs.* 179	Derbyshire	*lbs.* 145
Grey Granite	171	Tufa	76
Marble	172	Pumice	38
Portland	151	Brick	97
Yorkshire	156		

The weight to crush porphyry is 640,000 lbs.; grey granite, 165,000; marble, 100,000; Portland stone, 82,000; and brick 34,000 to 14,000 per foot.

The specific gravity of water at 5° is .9998; at 34 and 44° is .9994; at 39° is 1; at 54° is .99951; at 90° is .99511; at 100° is .99313; at 182° is .969; and at 210° is .95848. The expansion being at 34 and 44° from .00002 at 1° to .00005; at 100° being .00692; and at 212° being .04332. From 39° it expands both ways.

SPECIFIC GRAVITIES.

Agate, oriental	2.8
Alabaster, white	2.73
Amber, yellow	1.078
Antimony	6 72
Barytes	4.4
Basalt	2.98
Bismuth	9.8
Bone, ox	1.656
Box	1.03
Brass	7.824
Brick	2.
Butter	0.9423
Cedar	0 56
Chalk	2.252
Cinnabar	7.786
Cobalt	7.645
Coal	1.308
Copper	7 7
Cork	0.24
Diamond	3.52
Ebony	1 29
Elm	0.671
Fat of beef	0.9232
—— mutton	0.9235
Feldspar	2 5
Fir	0.6
Flint	2.59
Garnet	4 085
Glass, Crown	2.52
—— Flint	3.00
—— Plate	2.71
—— Bottle	2.732
Gold, pure	19.2587
—— Sovereign	17.629
Granite, red	2.654
—— grey	2.728
Gunpowder	0.836
Gypsum	2.167
Honey	1.45
Hornblende	3.6
Jasper	2.69
Iron, fused	7.2
—— bar	7.68
—— magnetic	4.52
—— stone	4.323
Ivory	1.825
Lead	11.352
—— black	5.77
Lignum Vitæ	1.33
Limestone	1.386 and 2.72
Mahogany	1.06
Magnesia, Hydrate	2.33
Manganese	6.85
Marble, Carrara	2 716
Mercury at 60°	13.58
—— solid, 40° below 0	15.612
Nickel	9 33
Nitre	1.7
Oak	1.17
Pearls	2.683
Peet, hard	1.329
Phosphorus	1 714
Platina	20 722
Porcelain, China	2.38
Porphyry, green	2.676
Pumice stone	0.9145
Quartz	2.647
Rock crystal	2.653
Ruby	4.283
Serpentous	2.43
Silver, virgin	10.474
Silver, shilling	10.534
Slate clay	2.67
Spar, fluor	3.156
Stalactite	2.324
Steel	7.84
Stone, paving	2.416
—— grinding	2.143
Sugar, loaf	1.606
Sulphur	2.033
Tin	7.17
Tin, hammered	7.519
Topaz	4.01
Tungsten	4.355
Wax, Bees'	0.0648
Zinc, pure	7.1908

FLUIDS.

Acid, Nitric	1.27
—— Muriatic	1.94
—— Sulphuric	1.84
Alcohol	0.837
—— do. pure	0.829
Beer	1.034
Blood, human	1.054
Cyder	1.018
Ether, Sulph.	0.73
—— Nitric	0.908
Milk, women's	1.02
—— cow's	1.032
Oil, Olive	0.9153
—— Linseed	0.94
—— Whale	0.9233
Turpentine, spirits	0.87
Urine	1.02
Vinegar	1.025

Water, distilled	1.000
—— sea	1.026
—— spring	1.0017
Wine, Port	0.997
—— Sherry	0.992
—— Claret	0.994
GASES.	
Air (1.2 water 1000)	1.000
Nitrous acid gas	3.176
Chlorine gas	2.47
Nitrous oxide	1.614
Carbonic acid	1.512
Sulphuretted hydrogen	1.19
Oxygen	1.104 and 1.0359
Nitrous gas	1.094
Olefiant	0.978
Azote	0.969
Carbonic oxide	0.957
Steam	0.6235
Ammoniacal	0.59
Carburetted hydrogen	0.555
Phosphuretted hydrogen	0.435
Hydrogen	0.074 and 0.0721

MECHANICS AND MACHINERY.

The mechanical powers may be reduced to three; but they are usually expressed as six, the lever, the wheel and axle, the pulley, the inclined plane, the screw, and the wedge.

In a single moveable pulley the power gained is doubled. In a continued combination the power is twice the number of pullies, less 1.

In levers, the power is reciprocally as the lengths on each side the fulcrum or centre of motion.

The power gained in the wheel and axle is as the radius of the wheel to that of the axle.

The power gained by an inclined plane is as the length to the height.

The power of a wedge is generally as the length to the thickness at the back.

The power of the screw is as the circumference to the distance of the threads, or as 6.2832 to that distance.

On an inclined plane, the power gained is as the length of the plane to the length of the base. The velocity in descending to that falling perpendicularly is as the height to the length, and the force is the same. For a body acquires the same velocity as in falling perpendicularly through the height of the plane; and a body acquires the same velocity, in falling down any number of planes, or down a curve as perpendicularly from the extreme height.

The momentum or force of a body is its matter multiplied by its velocity, and this is the basis of all mechanics and all philosophy. Velocity is as the space passed through in the same time, therefore matter and space are the source of all material power; and wherever power is present, there is some matter in some motion.

The contrivances for conveying the power of a machine to the work are
- Wheels and pinions on axles.
- Conical wheels.
- Rack work.
- Belts, bands, and chains.
- Cranks, single and double.
- The universal joint.
- The sun and planet wheel.
- The ball and socket.

The lever of Lagoaroust, for producing a rectilineal from an alternating circular motion.

Reversing a motion is produced by merely crossing a belt, or making one wheel work into another.

In wheel-machinery, to determine the number of revolutions of the last-moved part for one of the first-moved part, divide the product of the cogs in the driving wheels by the product of the cogs in the driven wheels.

The power gained by pulleys is twice the number of moveable pulleys.

The power of the wedge is as the length of the two sides to the thickness of the back.

The power of the screw is the length of the circle described by the power to the distance between the threads.

The friction of wheel-carriages is as the size of the axle to the circumference of the wheel.

It is the principle of *virtual velocities*, that if a system of bodies be in a state of equilibrium, in consequence of the action of any forces whatever, on certain points in the system; then were the equilibrium to be for a moment destroyed, the small space moved over by each of these points will express the virtual velocity of the power applied to it; and if each force be multiplied into its virtual velocity, the sum of all the products where the velocities are in the same direction, will be equal to the sum of all those in which they are in the opposite.

The pressure of fluids is distinct from the weight of their mass. It is as the height whatever the base. A cone and cylinder of liquid of equal heighth has the same pressure; but if frozen, the weight of the cylinder of ice would be three times that of the cone. The lateral pressure of fluids is also equal to the perpendicular.

A fly-wheel not only equalizes power, but it is augmented by making this large and heavy wheel acquire a previous great velocity.

A vane, or fly, in machinery, has such a surface, that a too rapid motion is corrected by resistance.

The following are the varied relations of forces: *b* the body, *f* the force,

m the momentum, v the velocity, s the space, t the time. Then severally—

$$b \text{ as } \frac{m}{v}, \text{ as } \frac{f}{v}, \text{ as } \frac{m\,t}{s}, \text{ as } \frac{f\,t}{s}$$

$$f \text{ as } m, \text{ as } b\,v, \text{ as } \frac{b\,s}{t}$$

$$m \text{ as } f, \text{ as } b\,v, \text{ as } \frac{b\,s}{t}$$

$$v \text{ as } \frac{m}{b}, \text{ as } \frac{s}{t}, \text{ as } \frac{f}{b}$$

$$s \text{ as } t\,v, \text{ as } \frac{t\,m}{b}, \text{ as } \frac{t\,f}{b}$$

$$t \text{ as } \frac{s}{v}, \text{ as } \frac{s\,b}{m}, \text{ as } \frac{s\,b}{f}.$$

The *centre of gravity*, or of percussion, putting a for a line, joining the vertex, and the middle of the base is, in different bodies, as under; taken from the vertex:

A plain triangle, $\frac{2}{3}\,a$,
A right cone, $\frac{3}{4}\,a$.

In a sector, as arc to chord, so is $\frac{2}{3}$ radius to the distance from centre.

In a sphere, segment of a sphere, spheroid, or conoid, the altitude being x, and the whole axis a.

The sphere, or spheroid, is $\frac{4a - 3x}{6a - 4x}$.
Hemisphere, or spheroid, $\frac{5}{8}\,x$.
Parabolic conoid . . . $\frac{2}{3}\,x$.
Hyperbolic conoid . . . $\frac{4a + 3x}{6a + 3x}$.

The centre of gravity and percussion of any number of bodies, or masses, in a right line, is found by multiplying each body by its distance from some fixed point in the line, and dividing the sum of the products by the sum of the bodies, then the quotient is the distance from the point.

Or if the bodies are not in one plane, a common plane must be assumed; and then the sum of the products of the bodies into their distances, divided by the bodies, is the distance of the common centre from the plane.

The *centre of oscillation* of a right-lined rod, is two-thirds of its length from the point of suspension.

In small arcs, the vibrations of equal pendulums are performed in the same time. The times are as the square-roots of the lengths. The lengths are as the squares of the number of vibrations in the same time. An elastic pendulum, vibrating between semi-cycloidal cheeks, performs all its arcs in equal time. Compensation, or gridiron pendulums, are formed of steel and brass alternately, so as not to vary in length by temperature.

The distance of *the centre of gyration* from the axis of rotation is as follows:

A right line in length $\times \sqrt{\frac{1}{3}}$.

Circle, or cylinder, about axis—Radius $\times \sqrt{\frac{1}{2}}$.

Circle about diameter—Radius $\times \sqrt{\frac{1}{4}}$.

Plane of a circle, about diameter $\frac{1}{2}$ Radius.

Surface of a sphere about diameter—Radius $\times \sqrt{\frac{2}{3}}$.

Solid globe, Radius $\times \sqrt{\frac{2}{5}}$

Cone, Radius $\times \sqrt{\frac{3}{10}}$

If P be any particle of B, and d its distance from the axis S; and G, and O, and R, the centres of gravity, oscillation, and gyration, the centre of gravity is $\frac{P\,d}{B}$; the centre of percussion $\frac{P\,d^2}{S\,G\,B}$; and the square of the centre of gyration $\frac{P\,d^2}{B}$.

The intersection of three lines, drawn from the angles of a triangle, to the middle of the opposite sides, is its centre of gravity and percussion. If the lines bisect the angles, it is the centre of the inscribed circle; and if perpendiculars to the opposite, the intersection of the centre of the circumscribing circle.

Resistance is an affair of experiment, generally a third but at other times less.

The friction of cylinders or wheels is as the pressure, and inversely as the diameter.—*Coulomb.*

The friction on undershot water-wheels is three-fourths the actual force of the water, which, in falling 15 inches, acquires a velocity of 9 feet nearly in a minute, and then if 265lbs. of head water fall 15 inches, the whole is 39750 for the force, but by experiment it raises but 9375lbs. 135 inches, or 1266. or one-fourth nearly. Then 1266 × by the velocity of the wheel is the whole force, according to Smeaton, independent of reactions of floats, &c. which gives 10 to 3, or 2.8 as the proportion of force and effect. In overshot wheels the power is greater.

The resistance in the same fluid to the same body is as the square of the velocity, because the number of atoms encountered is as the superfices of the moving body. The particular resistance of different fluids is to be determined by experiment. A ball which, without the resistance of air, ought to rise twelve miles, at 2000 feet per second, will only ascend but 2920 feet. Resistance, too, overcomes velocity, so as to render the velocity of falling bodies uniform, after moving through 8½ feet of water and 260 feet of air.

The force necessary to move a wheel-carriage on a level road, is about one-

twenty-fifth of the load; on a railway it is but the 150th. On a canal it is but the 600th.

Friction in drawing a body over an horizontal surface is equal to one-third or one-fourth, and another writer makes it 7 to 20. Friction of wheels or cylinders is as the weights divided by the diameters. In pulleys the friction is reduced one-half by grease.

Coulomb establishes that the resistance of fluids is as the velocity and cohesion or viscidity of the particles. And that as the resistance of oil to that of water is as 17.5 to 1, this is the law of their cohesion.

Friction is so diminished by art, that a stone of 1080 lbs., which requires a force of 758 lbs. to drag it on the floor of a quarry, requires but 650 lbs. to drag it on a floor of planks; and only 23 lbs. to drag it on soaped rollers on a wooden floor.—*Redelet.*

The least friction is when polished iron moves on brass.—*Coulomb.*

The draft of a waggon of 216 cwt. on pavement is 33 lbs.—on a gravel road 147 lbs.—on M'Adam's road 46 lbs. Horses always turn from a road to a pavement.

A coach, weighing 18 cwt., at 10 miles per hour, ascends a hill, 1 to 20, with a force of 318 lbs.—of 1 to 30, 200 lbs.—1 to 40, 172 lbs.—and 1 in 600, (nearly level) 128 lbs. In the last case, at 6 miles 111 lbs., and at 8 miles 120 lbs.—*Macneill.*

A man or horse will perform his labour with the greatest advantage, when the resistance is four-ninths of his natural strength, and when his velocity is equal to one-third of his greatest velocity when not impeded. The force of a man at rest is about 70 lbs. and his velocity six feet when not impeded, therefore his force is exerted to the best advantage by a resistance equal to 31 lbs. and a velocity of 2 feet per second. So with a horse, his greatest pull is 420 lbs., equal to 20 cubic feet of steam per minute, and his rate 10 feet a second, therefore his labour is best performed at 187 lbs. and 3ft. 4 inches per second.

A horse will draw 200 lbs. for eight hours, at $2\frac{1}{2}$ miles an hour; and the strength of five men is equal to one horse. According to work or position a horse can perform the work of seven men, or only of three men, but five is taken as the mean.

The force of a man in turning a winch is taken at 116lbs., or as much as would raise 256 lbs. 3281 feet in a day; his force in pumping is as 190, or eqnal to 419 lbs. in 3281 feet; in ringing 259, or 572 lbs. in 3281 feet; and in rowing 273, or 608 lbs., in 3281 feet.

Smeaton, a good authority, reekoned a horse equal to five men, and Bossuet seven men, and an ass to two men. A horse, says Desagulier, can draw 200 lbs. $2\frac{1}{2}$ miles per hour, for eight hours per day, or 240 lbs. six hours. Smeaton says, that a horse loaded with 224 lbs. can travel twenty-five miles in seven or eight hours.

The force of a horse, per Desagnlier, is 44000 lbs. 1 foot per minute.

Per Smeaton, 22916 ditto.

Per Watt, 33000 ditto.

Then, as Mr. Watt, in a steam engine, considers one-fourth lost by friction, he takes Desagulier's 44000 lbs. as the horse power in his steam-engine.

The velocity of running water is least at the bottom and greatest at the surface; *i. e.* greatest where least impeded; and the reaction is contrary.

A fall of one-tenth of an inch per mile will produce a motion in rivers. The greatest velocity is at the surface and in the middle, and the least at the bottom and sides. But as the velocity increases, the action on the sides and bottom increase also. The mean velocities are as the area of the sections.

Putting V for the velocity of running water per second, in inches, r the area of the transverse sections, divided by its peremeter, both in inches, b the distance in which the fall is $\frac{1}{b}$, Du Buat makes

$$V = \frac{297\,(\sqrt{r} - 0 \cdot 1)}{\sqrt{b} - \text{hyp. log.}\sqrt{b} + 1 \cdot 6} - 0 \cdot 3(\sqrt{r} - 0.1)$$

G vel. of at end of fall per second—then $\frac{G}{b}$; and putting $\frac{V^2}{m}$ for resistance $V = \frac{\sqrt{m\,g}}{\sqrt{b}} - m$ being a function of $\sqrt{r}$, and by experiment $= 243 \cdot 7\,(r^{\frac{1}{2}} - 0.1)^2$. Then $m\,g$ being $386 \times 243.7\ r$, the equation becomes $V = \frac{306 \cdot 7\sqrt{r}}{\sqrt{b}}$.

But Douglas finds V in practice $= \frac{297\sqrt{r}}{\sqrt{b}}$.

The centrifugal force of a wheel is the multiple of the fall of a body in a second, 16.087 by the square of 3.14159, divided by the diameter of the wheel in feet $\times$ the square of the time of one revolution. This quotient, $\times$ the weight, is the force. Thus the great grindstones at Sheffield, which are 44 inches in diameter, weigh half a ton, and revolve 328 times in a minute, have a centrifugal force of $23\frac{1}{2}$ tons.

An undershot wheel has the greatest force when its circumference moves with five-sixths of the velocity of the stream, and the best velocity of an

overshot wheel is 3 feet in a second, and depends on proportioning the buckets, the power of the water being as the height it falls through. In the undershot wheel the power is to the effect as 3 to 1, and in the overshot wheel double, or 3 to 2.

230 gallons on an overshot water-wheel; a 6.12 inch steam-engine cylinder; 1 horse; 5 men's power; windmill sails 17.89 feet, are all equal to the raising of 1000 lbs. avoirdupois thirteen feet in a minute.

The common velocity of over-shot wheels is three feet per second.

Horse power in steam-engines is calculated as the power which would raise 33,000 lbs. a foot high in a minute, or 90 lbs. at the rate of four miles an hour.

One-horse power is equal to the lifting by a pump 250 hogsheads of water 10 feet high in an hour. Or, it will drive 100 spindles of cotton yarn twist. Or 500 spindles of No. 48 mule yarn, or 1000 of No. 110, or 12 power looms.

One-horse power, in a steam-engine, is produced by 16 lbs. of Newcastle coals; 50 lbs. of wood, or 34 lbs. of culm. Coals 1, wood 3, and culm 2, give equal heats in the production of steam.

1584 gallons; a cylinder 14.2 inches; ten horses; fifty men; or 56.57 feet Dutch sails are equal to raising 1000 lbs. 130 feet in a minute.—*Fenwick*.

By the steam-engine one bushel of good coals raise from twenty-four to thirty-two millions of pounds one foot per minute. Four bushels of coals per hour, with a cylinder of $31\frac{1}{2}$ inches, and $17\frac{1}{2}$ strokes of seven feet per minute, is a force equal to forty horses constantly. A rotative double engine, with a cylinder $23\frac{3}{4}$ inches, making $21\frac{1}{2}$ strokes of five feet per minute, is a twenty-horse power; and a cylinder $17\frac{1}{2}$, making 25 strokes of four feet is a ten-horse power: the consumption of coals being proportional.—*Watt*.

A cubic foot of steam, at 212°, is produced by a cubic inch of water, *i. e.* as 1800 or 1728 to 1.

The piston of a steam-engine works twice the length of the cylinder at each stroke; and at a maximum, in a 9-feet stroke, 14 per minute, travels 259 feet, or with a 6-feet stroke, at 21 per minute, 210 feet.

The effective force of a piston is taken at 10 lbs. per square inch, or two-thirds of the atmospheric pressure, and is of course ten times the area in lbs.

The force, by the number of feet the piston moves per minute, is the momentum, or lifting power per minute.

The momentum, or lifting power per minute, divided by 44,000, a one-horse power, is the number of horses to which the engine is equal.

The nozzles of safety-valves are one-fifth that of the cylinder.

A horse-power requires from 5 to 7 gallons of water per minute for condensation of the steam.

A steam-engine, whose cylinder is 31 inches, with 17 double strokes per minute, performs the constant work of 40 horses with 5 tons of coals per day. One of 19 inches and 25 strokes, of 12 horses, with a ton and a half of coals per day. They raise 20,000 cubic feet of water 24 feet for every cwt. of coals.

The power of a steam-engine twists the largest cables and spins cotton thread 150 miles to the lb. by the intervention of wheels and cross-bands for decreasing or increasing speed.

The first idea of steam-navigation was set forth in a patent, obtained in 1736, by Jonathan Hulls, for a machine for carrying vessels against wind and tide, or in a calm. In 1778, Thomas Paine proposed, in America, this application of steam. In 1781, the Marquis de Jouffroy constructed one on the Soane; and, in 1785, two Americans published on it. In 1789, W. Symington made a voyage in one on the Forth and Clyde canal; and, in 1802, the experiment was repeated with success; and soon after Fulton visited Mr. S., saw the vessel, sailed in her, and took notes of particulars. He then went to America; and, in 1807, started a steam-boat on the Hudson's River, which succeeding, was imitated by hundreds.

In June, 1819, the *Savannah* of 350 tons, came from New York to Liverpool by steam.

A steam-vessel passed from Gravesend to Milford, amidst contrary winds, in less than 3 days, which would have employed a sailing vessel 12 months.

Government steam-vessels are built to carry 2 bombs on pivots of 10 inches calibre.

Brown's gas vacuum-engine 4 feet $8\frac{1}{2}$ inches diameter, makes 11 strokes in two minutes, and raises at each stroke 750 gallons of water. The vacuum is formed by the combustion of a volume of carbonic oxide gas cheaply made.

Steam power, to convey coals on a rail-way, was first employed by Blenkinsop, at Hunslet, near Leeds; and afterwards for passengers and goods, on the Stockton and Darlington rail-way. The speed was from five to eight miles an hour, and the charge one half, inside passengers paying $1\frac{1}{2}d.$ a mile, and outside $1d.$ A similar railway has since been executed from Liverpool to Manchester, 33 miles long, at nearly a dead level. It enters Liverpool, and is carried down to the quays by a mag-

nificent tunnel, under the town, 1¼ mile long, and a branch 291 yards. Steam-power for conveyance is employed upon it.

The first rail-way coach was from Stockton to Darlington, with one horse, 12 miles in 1¼ hour.

In the trial of loco-motive steam-carriages at Liverpool, in October, 1829, Braithwaite's carriage, including water and fuel, weighed 3 tons 14 cwt. Stephenson's carriage 4 tons 3 cwt., with water and fuel, in a separate carriage, 1 ton 14 cwt. 3 qrs. Stephenson's carriage ran from 14 to 17 miles an hour, and sometimes 18. Braithwaite's ran 21 miles 1·6th, and with 45 passengers; in a train of waggons, in a second experiment went 22 miles an hour, and occasionally 32 miles.

The carriage alone was 2 tons 15 cwt.

Forty-five gallons of water, in boiler, at 10 lbs.	4
Water, in tank	11
Water-tank	2½
Coke	1¾

Which, with weight added by the judges, made 10 tons.

The diameter of the cylinder was 6 inches, the length of the strokes 12 inches. The carriage-wheels 4 feet 2 inches; the pressure under 50 lbs. per square inch. The number of strokes was from 130 to 142 per minute.

Rail-roads are called Tram-ways, or flat bars, when with a rising rim on the outside; or Edge-ways, in which the bars present their breadths to the load. Double rail-ways are 20 feet wide.

Rail-ways, made of wood, were first used at Newcastle, about 1680, and made of iron at Whitehaven, in 1738. They enable single horses to perform the work of 6 or 8 horses, and some persons have carried it higher. The friction is 115th part of the load, and on turnpike-roads it is from a twelfth to a fifteenth. The turnpike-roads were first established in the reign of Queen Anne: till then all roads were repaired by the parishes. R. Phillips, in 1736, published the first tract on road making, and he recommends washing them lengthways, to carry off the argillaceous matter, a plan since enforced by Bakewell and Wilkes. Loudon M'Adam's roads were introduced about 1818; he prescribes the breaking of stones to 6 ounces weight, and calculates the expence of breaking stones at a shilling a ton. Clean flints and granite clippings answer best. In the evidence about M'Adam's roads, it appeared that stage-coach horses last from 3 to 6 years, and that light-coaches generally weigh 2¼ tons, the coach 1, the passengers 1, and the luggage ¼.

The first Iron Rail-road was laid down at Colebrook Dale, in 1786. Near Newcastle, there are 250 miles of Iron Rail-way above ground, and nearly the same beneath. In Glamorganshire there are 300 miles, from different coal-works and mines to quays.

The railway-carriages have travelled from Manchester to Liverpool in an hour and a quarter, 33 miles.

Twenty tons weight of coals may be drawn by canal two miles an hour, during ten hours per day, by the labour of one horse and two men, or a man and a boy; 20 by 2 by 10 = 400, the canal power. But 30 tons can be drawn by a loco-motive steam-engine, at the rate of 15 miles an hour, for at least 20 hours in a day; 30 by 15 by 20 = 9000, the railway power. The ratio of 400 to 9000 is nearly that of 1 to 22; *i. e.* the loco motive engine will do, per day, the work of 22 horses, and 44 men and boys by canal carriage.

In 1831, there were 350 steam-vessels in the United States. In France, 40. In Russia, 3. In Holland 2. In Spain 1. In Italy, 3. In Greece, 6. In Egypt, 2. In Bengal, 6. In Great Britain, 400.

The strength of an inch square of different kinds of wood pulled lengthways, has been determined as under:

Beech	6000 lbs.
Oak	7000
Alder	5000
Ash	6000
Fir	4000
Birch	4200
Walnut	5000
Cedar	5000

A piece of fir two inches in diameter bears 7 tons; a rod of iron, one-third of an inch diameter, 3 tons; and a hempen rope of the same size will carry 1000 lbs. The rule is as follows; square the diameter in inches or parts, and multiply for fir by 9, for rope by 22, and for iron by 106, the product is cwts. A six-thread rope bears 631 lbs., and a nine-thread 1014 lbs., a twelve-thread 1564 lbs., and an eighteen, 2148 lbs.

The lateral strength of bodies is as the area of the section. A piece of freestone requires 205 lbs. to pull it asunder, and the lateral strength of fir is 18 times less than its strength lengthways. Emerson determines that a rod of good oak, one inch square, will for a short time bear in the middle 330 lbs. and permanently 207 lbs. The proportions for different substances of equal lengths and sizes are, oak and yew as 11, ash and elm as 8½, walnut and red fir 7, beech, birch, alder, and white fir 6, iron 107, brass 50,

bone 22, lead $6\frac{1}{4}$, freestone 1; in regard to loads placed in their middle.

In resisting compression the strength of timber in a rod 4 feet long and seven-tenths of an inch square is for fir 226 lbs., beech 146 lbs., and oak 86lbs. Oak will bear a pressure of 4000 lbs. per square inch, but other experiments make it 3000 lbs. Short specimens give to oak a comparative power of resisting pressure of 12. Willow and fir 9, and ash, elm, and poplar 7.

The cohesion of cast-iron is about 30000 lbs. per square inch.

A bar of cast-iron 1 inch square cast horizontally will carry a weight of 18656 lbs. and vertically 19488 lbs. Malleable iron 27 tons.—*Barlow.*

The strength of beams bearing in the middle is inversely as their lengths; also directly as their breadths, and the square of their depths. Cast-iron is in pounds the square of the inches in the depth × 850, divided by the product of the length in feet by the in-breadth in inches.

Water presses on the bottoms of vessels as the base by the height, whatever be the form or bulk of the height. This is the hydrostatic paradox; and, by the application of it, slender pipes are made to produce an extraordinary pressure at the base, for it is always as the base by the height.

The smallest quantity of water balances any quantity however great, on the principle of finding its level; hence, if a long pipe be inserted in a butt of water, however small its bore, it will burst the butt as though it had been blown up with gunpowder. Bramah's press is made on this principle, and a column of water half an inch diameter, acting on a square foot of water, produces 576 tons pressure, or upon a yard in diameter, of 41472 tons, and is made to act so as to hear upon any substance.

The quantity of water discharged through different apertures, with different heights of the fluid, is as the areas of the apertures and the square-roots of the heights; but one-third more will be discharged through a pipe than through the aperture.

The life-boat was invented by Henry Greathead, of South Shields, in consequence of a premium being offered for the object. Its principle is, such an elevation of the two extremities as that, if overset, these elevated ends would be as light as the body of the boat; and, to add to the effect, several pounds of cork are attached to the ends. The shape of the boat is curvelinear, approaching that of a crescent.

The life-buoy used in the Navy consists of two hollow copper vessels balanced by a mast fitted with shifting lead, and with ropes to hold by. It is ingeniously let down in case of falling over-board, and in the night provided with port-fire. That important instrument the anchor consists of the ring, the shank, the flukes, and the stock. The flukes consist of the palm, and the bill and the stock is the beam at right angles to the fluke, which, lying horizontally, causes the bills to fix in the ground. Anchors, for the navy, weigh from 1 cwt. to 90. In the first the shank and stock are 5 feet 8 inches each, and the fluke 1 foot 10 inches. And in the largest, the shank and stock are 20 feet each, and the fluke 6 feet 8 inches. The cost of the largest (called the bower-anchor) is 415*l.*; and every first-rate has four. In 36-gun frigates the bower-anchor weighs 40 cwt., and costs 115*l.* In seventy-fours they weigh 70 cwt., and cost 285*l.* Every man-of-war has four bowers, 1 stream, about a fourth of the weight, and 1 kedge, half the stream.

Sepping's diagonal trussing saves 2080*l.* of timber in a 74. 10,420*l.* instead of 12,500*l.*

Brunel's block-machine unites the action of 16 different machines in one steam-engine—7 for the shell, and 9 for the sheave. 10 men do the work of 110.—*Dupin.*

It makes about 200 sorts and sizes of blocks:—

There are 72 sizes of thick blocks.
48 of thin blocks.
10 of clue-line ditto.
20 sister blocks.
20 topsail ditto.
24 fiddle ditto.
20 jack ditto.

Of which varieties, the machines make 1420 blocks per day.

A seventy-four gun ship requires about 1300 blocks, and there are 200 different sorts and sizes, varying from 4 to 28 inches in length. Every gun requires 6 blocks.

Men working at the Tread-Mill ascend nearly half a mile an hour.

Fulton's Torpedos for blowing up ships, patronized by Pitt and Dundas, consisted of a chest of combustibles, to be fired by clock-work and navigated under water, so as to entangle itself in a ship's bottom.

In boring the maximum of advantage in cutters and metal is a velocity of 78.54 feet per second, but in turning the velocity is double. 1-inch diameter requires 25 and 50 revolutions.

In brass wire drawing a piece of 44 inches is in 6 holes drawn out to 144 feet.

Dr. Hooke, the inventor of the System of Physics adopted by Newton,

was the first who applied a spring to a watch, in 1658.

Lehmann, of Prague, first practised glass-cutting in 1609.

The Nottingham lace-frame was first contrived about 1768, and it has now grown into a manufacture of overgrown magnitude.

A metal pen, with an inclined nib, was invented in 1831, tending to increase the beauty, clearness, and rapidity of writing. In the public offices, &c. it has superseded all other pens.

Androides, to perform human actions, have been made in all ages. Bacon made one to speak; and Albertus Magnus spent 30 years in making another. The Writing Androides is merely a pentograph, worked by a confederate out of sight. So also the Automaton Chess-player, and the Invisible Girl; but they are in general constructed of wheel-work. Vaucanson, in this way, made a Flute-player; Kempelen, the Chess-player and Speaking Figure. Mailardet and Hancock made many.

Vaucanson made an artificial duck, which performed every function of a real one, even an imperfect digestion, eating, drinking, and quacking. A coach and two horses, with a coachman, footman, page, and a lady inside, were made by Camus, for Louis XIV., when a child. The horses and figures moved naturally, variously, and perfectly.

Cotton-spinning machinery, and manufacturing machinery in general, are merely varieties of these inventions of Androides, and toy-makers; a central power, with axles, wheels, cogs, ketches, ratchets, straps, lines, levers, screws, &c. &c. variously combined, constitute the wonders of Lancashire, Yorkshire, and Warwickshire.

The most effective machines for saving and superseding human labour, now in use, are of American invention.

1. Dyer's Wire-card Machine, at Manchester.

2. Wilkinson's Reed Machine, at Manchester.

3. Church's Nail Machine, at Birmingham.

4. Fulton's Steam-vessel.

5. The new machine for preparing and spinning by one operation and movement.

6. Perkins's Engraving Apparatus.

The most perfect machines of British Invention have been—

The Steam-engine, in origin and progress, by 20 or 30 Patentees.

Hargrave's Spinning Jenny and Doffer.

Arkwright's Water or Steam-power Frames.

Crompton's Mules.

Cartwright's Power Looms.

De Jongh's Power Mules, &c.

Heathcote's Lace Frames.

Carpet Looms for all colours.

Cloth Cropping Machines.

Tilting, Rolling, and Slit Mills.

Appleoath's Printing Machines.

Babbage's Calculating Machine.

Apparatus for Grinding Lenses.

Hancock's Steam Carriage.

A dredging machine on the Thames, with a 16-horse power, raises 300 tons of mud and gravel per day.

The greatest height to which a projectile ascends, is the square of the velocity by the square of the sine of elevation. The time of flight is the velocity into the sine of elevation.

Winds will raise a canal of four miles four inches at one end.—*Smeaton.*

Storms, in the Shetland Islands, have moved blocks of granite of 300 cubic feet 80 or 90 feet.

To compress air into twice its density requires a force of 15 lbs. 3 oz., or 4 times, it is 45 lbs. 9 oz.; and so for other diminutions less 1. Volumes of pressure are also the number less 1.

The log-line is divided into spaces of fifty feet, and the way measured by a half minute sand-glass, which bears nearly the same proportion to an hour that fifty feet bear to a mile.

An iron ball 3 lbs. weight, or 2.78 inches diameter, thrown with a velocity of 1800 feet, is resisted with a force of 176 lbs., and a ball 1.05 lb. with a velocity of 2000 feet, will ascend but half a mile, and if in vacuo, it ought to go $11\frac{3}{4}$ miles.—*Hutton.*

Cannon-balls moving 1600, 1200, 1500, and 1060 feet per second, or near the mouth of the gun, penetrated elm 20 inches, 15, 30, and 16 respectively; oak at 1200, 34 feet; and earth at 1300, 15 feet. The balls were from 2 inches to $5\frac{1}{2}$ in diameter.

In sandy soils, the greatest force of a pile-engine will not drive a pile above 15 feet.

Robins says, that no field-piece should be loaded with more powder than a fifth or sixth of the weight of its ball; nor any battering-piece with more than a third.

The velocity of the explosion of gunpowder, fired alone from a cannon, is 7000 feet per second; and, at the moment of explosion, four times greater. Cannon-balls go farthest at an elevation of 30°, and less as the ball is less.

13-inch mortars range $2\frac{1}{4}$ miles, and weigh 82 cwt., are 5 feet 3 inches long, and take a charge of from 20 to 30 lbs. of powder; 10 inch, range 2 miles; and 8 inch, 1 mile 2 feet 1 inch long, with 2 lb. 2 oz. of powder; 13-inch, in the

land-service, are 3 feet 8 inches long, with 9 lbs. 1 oz. of powder. 68-lbs. shot are 8 inches in diameter, with 9 lbs. of powder, and bore 4 inches: a 13-inch shell weighs 198 lbs., and is charged with 6¾ lbs. of powder.

The Shrapnel shell is a bomb filled with balls, and a lighted fuse to make it explode before it reaches the enemy, when the bullets separate, and proceed as before.

The range of carcasses is about two miles, and those of 13-inch diameter require about 30 lbs. of powder.

The turnpike-roads and paved streets are about 21,000 miles, and the parish-roads are estimated in a parliamentary paper at 95,000. The tolls are about 600,000*l*., and the expenditure on all the roads is about one million and a half.

In 1678, a coach with six horses was six days in going from Edinburgh to Glasgow and back, 44 miles; and about 1750, it was a journey of a day and a half; though, in 1832, but five hours. In 1763, there was but one monthly coach from London to Edinburgh, and it was 14 days on the road. In 1777, the coach from Birmingham to London was 27 hours on the road; and so late as 1785, the coach was 12 hours passing 40 miles from Chester to Shrewsbury. In 1773, post-chaises broke down twice between Birmingham and Bath, owing to the ruts being equal to the radius of the wheel.

The diminished expences of well-made roads would be five millions per annum.—*M'Adam.*

The Swedish roads are on the M'Adam principle—broken granite.

A fall of 3 inches from the centre to the sides, is sufficient in a road of 30 feet.—*M'Adam.*

Stones are broken to 6 ounces, but round pebbles of the same weight do not imbed. Ten inches depth of well-consolidated materials are sufficient, whatever the substratum, and better soft, than hard or rocky. Five tons of sized stones over a morass, last as long as 7 on a hard bottom.—*M'Adam.*

Roads should be scraped when dirty—the ruts filled, and hedges and trees kept low, for sun and air.

7° or 8° is the greatest angle for carriages; 15° for beasts of burden, and 35° cannot be ascended by a man without steps, and even with steps 44° is very difficult.—*Saussure.*

10 or 12 feet of paving by the side of the foot-path, is recommended for the heaviest loads.

In roads, the draught in a rise or fall is 262.2, more or less, at 1 foot in 9. 236, at 1 in 10; 118, at 1 in 20; 78.7, at 1 in 30; 47.2, at 1 in 50; 1 in 100, 23.6; 1 in 150, 15.7; 1 in 200, 11.8; 1 in 400, 5.9; 1 in 600, 3.94; 1 in 1000, 2.36; 1 in 2000, 1.18; and 1 in 4000, 0.59. The difference between a rise and fall, of 1 in 156 feet, in lbs., in the draught of a stage-coach, is 128 and 82; of 1 in 245 feet, is 125 and 96; and 1 in 600, is 112 and 100.

Raised foot-paths and 2 or 3 seats per mile characterize the best modern roads.

The mail-coaches pass from London to Birmingham, 110 post-office miles, in 11 hours, 58 minutes; to Caernarthen, 204 miles, in 27 hours, 31 minutes; to Devonport, 219 miles, in 23 hours, 48 minutes; to Bath, 109 miles, in 11 hours, 54 minutes; to Thurso, 799 miles, in 105 hours, 45 minutes—which includes York, 196 miles, in 21 hours, 31 minutes; Edinburgh, 399 miles, in 43 hours, 38 minutes, leaving 62 hours for the last 400 miles in Scotland. They keep time to a minute by regulation at every stage, the average pace being 9 miles an hour in England.

Stage-coach horses last on the average from 3 to 5 years, according to the quality of the road. Three coach-houses in London keep above 1100.

The tolls on the 25,000 miles of turnpike-roads of England and Wales are one million and a quarter.—*M'Adam.*

In Holstein, the Diligence travels but 2½ miles an hour.

The fly-shuttle was invented by John Kay, who, in consequence, fled for safety to France. The spinning-jenny, &c. &c. by Hargrave, at Stanhill, near Blackburn, who, in consequence, was driven to Nottingham, and died in poverty. The power-loom, by Cartwright, who got 10,000*l*. from Parliament for 10,000*l*. expences, and 10 years labour. The mule by Crompton, who got 5000*l*. for 5000*l*. expences and 7 years labour.

About 140 patents are granted per annum, and in 14 years about 1900 remains in force. Two-thirds are never worked for want of capital.

A patent in the United Kingdom, owing to the multiplied fees of sinecurists, costs from 100*l*. to 125*l*., and it secures for 14 years. In France and the Netherlands it is for three terms of five years, which costs from 12*l*. to 60*l*. in France, and 6*l*. to 30*l*. in the Netherlands. In the United States for 14 years, and costs but 6*l*. 15*s*. Spain grants 15 years to an inventor, 10 years to an improver, and 6 years to an introducer. The number in England, France, and Austria, is about 160 in each.

Rollers for distributing ink on types are made of glue and treacle.

Inking types, in press-work by balls, consume above double the ink that is used in printing-machines.

The best workmen use the simplest tools. The highest polish of cutlery is produced by a woman's hand.

E

The largest battering rams of the ancients were eqnal in force to a 36-lb. shot from a cannon.

Aaron Raschid, in 802, sent from Bagdat, among other presents, to Charlemagne, a clock of curious workmanship.

In 1751, a globular bottle was blown at Leith, capable of holding two hogsheads. Its dimensions were 40 inches by 42. This immense vessel was the largest ever produced at any glass-work.

Enchasing is performed by punching from within.—Wood sunk to a great depth, is brought np heavier than water, by the satnration of pressure.

The London and Birmingham rail-way is proposed to be 112½ miles long, and rise 256 feet. The different levels require one rise of 315 feet in 15 miles, or 11 minutes only. There will be 10 tunnels, and 2 lines, six feet distant, with places for turning out. It will pass under Primrose Hill, by Watford, Northampton, and Kilsby, entering Warwickshire near Farnborough. For 15 miles, it will pass through clay; for 19, chalk; 20, marl and clay; 16, lias marl; and 24½ red marl and sand stone. The travelling rate will be 20 miles an hour, and the distance be performed in 5½ hours, or between breakfast and dinner. A similar railway is in progress from Birmingham to Manchester, of 4½ hours distance.

There are now in this conntry not less than 15,000 steam-engines at work, some of 1000 horse-power. Tuking it that, on an average, these engines are each of 25 horse-power, this would be equal to 375,000 horses. Five men and a-half are equal to the power of a horse; we have thus, therefore, a power, through the medium of steam-engines, equal to near two millions of men. Each horse for his keep per year requires the prodnce of two acres of land, and thus 750,000 acres are at the disposal of the inhabitants, more than if the same work, which is now done by steam, were performed by horses.

By Mr. Williams's evidence, England has of canals 2,400 miles, navigable rivers 2,000, rail-roads, at least, 400. Ireland has of canals 280 miles, navigable rivers 150, river Shannon 230.

Animals, in civilized countries, increase the labouring and productive powers of man to four and a-half times what man could perform alone.

Mr. Walter Hancock has lately run a steam-engine coach between Whitechapel and his residence at Stratford. Mr. G. Gurney has run another of his invention between Cheltenham and Gloucester, and Messrs. Braithwaite and Co. another on the Paddington-road. It has been a triumph of mechanics and ingenuity. Members of the legislature were found base enough to bring in turnpike-bills to impose a 2*l.* toll on steam-carriages at every gate; and some such laws had passed, and others were in progress, when, by the energy of Messrs. Hancock, Gurney, Farey, Torrens, and Davies Gilbert, this folly was arrested; and a Committee of Parliament have since declared that "the substitution of inanimate for animate power is one of the most important improvements in the means of internal communication ever introdnced, and its practicability they consider to be fully established."

It appears that Mr. Hancock's coaches run from 10 to 15 miles an hour; and Mr. Gurney's ran 396 jonrnics of nine, in an average of 55 minutes, the whole cost of fuel being bnt 78*l.* in the 3,644 miles. Two companies have been formed by Mr. Hancock, one for Greenwich and Brighton coaches, and another for Paddingtnn and Hampstead. Their speed to be 10 or 12 miles an hour, and their consumption of coke a sack to every eight miles. The number of passengers from 20 to 30, at half the nsual fares. Double the power exerted on a level road, carries one of these carriages up the steepest hills, of from 3 to 4 inches of ascent to the yard.

A Committee of Parliament, after sitting three months, passed the following Resolutions on this subject:—

1. That carriages can be propelled by steam on common roads at an average rate of ten miles per hour.

2. That at this rate they have conveyed upwards of fourteen passengers.

3. That their weight, including engine, fuel, water, and attendants, may be under three tons.

4. That they can ascend and descend hills of considerable inclination with facility and safety.

5. That they are perfectly safe for passengers.

6. That they are not (or need not be, if properly constructed,) nuisances to the public.

7. That they will become a speedier and cheaper mode of conveyance than carriages drawn by horses.

8. That, as they admit of greater breadth of tire than other carriages, and as the roads are not acted on so injuriously as by the feet of horses in common draught, such carriages will cause less wear of roads than coaches drawn by horses.

100 tons is drawn by a single railway engine from Manchester to Liverpool in an honr and a half, while a stage-waggon would draw but 8 tons the same distance of 30 miles in a day.

The Sampson and Goliah, two engines

on the Manchester railway, undertook to convey a thousand bags of New Orleans cotton from Liverpool to Manchester. They started together from Liverpool at eight o'clock, and arrived at Manchester at half-past 11. The total number of bags of cotton brought by the two engines was 1035. Of these, the Sampson brought 549; and, as each bag of American cotton averages 4 cwt. the following may be considered a correct estimate of the Sampson's load:—

	Tons.	Cwt.
549 bags of cotton, at 4 cwt. each	109	16
Tares of 30 waggons	42	15
Weight of persons on the train	1	0
Weight of the engine	8	0
Total	161	11

Besides tender, coke, water, &c. amounting to several tons more.

The recoil of a gun is equal to the momentum of the ball, but experiment gives it $1\frac{1}{2}$ the ball.

Women originally spun, wove, and dyed; and the origin of these arts is ascribed, by ancient nations, to different women, as women's arts. The Egyptians ascribed it to Isis; the Greeks to Minerva; and the Peruvians to the wife of Manco Capac.

In most eastern countries, the employment of weaving is still performed by the women, and many factories are wrought by women in England.

Weaving is performed by stretching threads generally horizontally, called the *warp;* and then raising or depressing certain portions of the warp-threads by treddles, so as to pass between them a thread called the *weft*, by means of a *shuttle*, to which the *weft* is fastened. This general principle is infinitely varied by mechanical ingenuity.

The reed for weaving in England is counted by parts of 36 inches. In Scotland and Ireland, by parts of the Scotch ell, 37 inches; the Dutch, 40 inches; and the French, 34 inches; so that 100 of Scotch and Irish is equal to 92 French, 108 Dutch, and 103 English.

Carding wool by hand, previous to 1800, used to employ many thousand wool-combers; and the preparing and inserting the wires, many thousand women and children; but combing, both of cotton and wool, has for some years been performed by rotating machinery, and the cards are made by Whittamore and Dyer's American machine, with astonishing celerity.

There are, in and near Leeds, about 2400 looms for weaving woollen cloth, employing five hands each in preparing, weaving, dyeing, and finishing. Of these, it appeared that, in 1829, not more than half were employed.

There are about 240,000 hand-looms in Great Britain, and 75,000 power-looms, each equal to three hand-looms, making 22 yards each per day.

Till 1776, cotton-spinning was performed by the hand-spinning-wheel, when Hargrave, an ingenious mechanic, near Blackburn, made a *spinning jenny*, with eight spindles, and having permitted one Peel, of that place, to view it as a curiosity, under an engagement of secrecy, Peel availed himself of Hargrave's invention, while Hargrave, on the report of the invention, had his cottage pulled down by a mob. Hargrave was obliged to remove to Nottingham, where he assisted Arkwright, and died in poverty. His last surviving daughter, the very one who worked the first jenny, was living in 1829 at Manchester, on a charitable stipend of 3s. a week, while the families of Peel and Arkwright had become the most wealthy in Europe. The case of this poor woman was, in 1828, submitted to Mr. Secretary Peel, but he did not vouchsafe an answer, though the cotton manufacture consequent on this invention, had probably yielded to Britain 1000 millions sterling.

Hargrave also erected the first carding-machine, with cylinders. Arkwright's machine for spinning by water, was an extension of the principle of Hargrave; and he also applied a large and small roller to expand the thread, and, for this ingenious contrivance, took out a patent in 1769. At first, he worked his machinery by horses; but, in 1771, built a mill on the stream of the Derwent, at Cromford. In 1772, his patent was contested, and cancelled in 1785, on the evidence of the widow and sons of Hargrave, who appeared to have been the inventor of the crank, so essential to the carding process.

In 1779, Crompton invented *the mule*, a further and wonderful improvement of this art. By its means, cotton is spun of a degree of fineness which never could be approached by the thumb and finger, and 200 hanks to the lb., each 840 yards, is its average performance, and 300 and 350 hanks are often produced. The number of hanks is called the *number*, and, for different purposes, the lb. is spun from No. 6 up to No. 300; 30 being the average for hosiery, 200 to 280 for lace, 20 to 50 for calicoes, and higher numbers for muslins and delicate articles.

The largest spinning manufactories are at Manchester, and each employs from 600 to 1000 men, women, and children. The buildings are five or six stories high, filled with frames, each containing some hundred spindles, wrought in every part of the process by steam-engines.

Tanning by atmospheric pressure and the forcing pump, is performed a few

weeks, and used to employ twelve times the period.

The super-incumbent pressure so drives water into the pores of wood at great depths in the sea, as in an hour to increase its weight $\frac{3}{11}$ths., and its bulk $\frac{1}{20}$tb.—*Scoresby.*

By the machinery at Weevil, Portsmouth, eight men and two boys manufacture 90 cwt. of biscuit in an hour and a half; less time than ten men by the old method manufactured 36 cwt.

In 1811, the printing machine was invented by Koenig; it perfects 900 sheets in an hour; Applegath's 1000.

The chariots of the ancients were like our one-horse chaises, or phaetons. Close-carriages began to be used by persons of the highest quality in the 14th and 15th century. Paris had three in 1550, and Henry IV. one, but without straps or springs; and, in the same age, there were 36 at Warsaw, drawn by six horses. In sundry places men were forbidden to ride in them, as effeminate. They were first made in England in the reign of Elizabeth, and were then called whirlicotes. The Duke of Buckingham, in 1619, drove six horses; and the Duke of Northumberland, in rivalry, drove eight. They were first let for hire in Paris, in 1650, at the Hotel Fiacre; and hence their name. In London, they were first let for hire in 1625, and were 20 in number; in 1637, they were limited to 50; and, at the restoration, 400 were licensed. In 1830, 1200 coaches and chariots, and 200 cabriolets. In 1800, the number of four-wheeled carriages in Great Britain was 17,992: two-wheeled carriages, 14,771; and tax-carts, 16,968.

The Pitt and war party, from 1793 to 1823, had a conviction that, with our machinery, we might "manufacture for all the world," and that our population, driven from small farms, for the purpose of getting higher rents from speculating genteel farmers, might subsist on the demands of foreign nations. The idea originated in our monopoly of the steam-engine, cotton-spinning frames, power-looms, &c. &c., by Watt, Arkwright, Crompton, Cartwright, &c.; but as foreigners soon smuggled or imitated these, the monopoly could not be maintained; and, at length, the free exportation of machinery, and of artizans to work it, was permitted. The best machinery in Europe is now made at and near Strasburgh, and thence exported by the Rhine and Danube to all parts of the world; Liege also excels in the same manufacture, and no artizans can compete with the Americans in perfection and originality.

ANATOMY AND PHYSIOLOGY OF MAN.

The genus man is divisable, according to colour, into four species: the white, the copper-coloured, the tawny, and the black.

The *whites* are sanguine or reddish, dead white, and dark.

The *tawny* are brown and dark brown, as the Arabs, Jews, Hindoos, Persians, &c.

The *dark brown* are the Calmuc Tartars, Chinese, and Gypsies.

The *copper-coloured* are the native Americans.

Other *black-brown* are the Malays and South Sea Islanders.

The *blacks* are Negroes, with woolly hair, and Caffres, &c. with straight hair.

The species of men are also determined by the hair, as, woolly or long, black like the Hindoos, or flaxen and white.

By physiognomy, as, the European, the native Americans, the Negro, the Hindoo, the Chinese, the Tartar, and the Hebrew.

By skull, as, the *Caucasian*, round, cheek-bones low, and face oval; the *Mongalian*, head square, cheek-bones projecting outwards, nose flat, angle of the eye depressed to the nose or cat-like; the *Negro*, narrow and compressed, forehead very convex, cheek-bones projecting forwards, nose flat, and nostrils wide. The American like the Mongalian, but the forehead low, and eyes sunk; the Malay, summit narrowed, upper jaw projecting, features more prominent than the Negro.

Man is found from the 75th degree of north latitude, to the Terra del Fuego, south.

Buffon made seven varieties of the human race, in which he included stature; and some naturalists have considered the Goths with their blue eyes, flaxen hair, and fair skins, as distinct from the Caucasian, which last includes the western Asiatics, the Georgians, Circassians, Persians, Arabians, &c. while the distinct Gothic race is found in Denmark, Sweden, Norway, Iceland, the Isle of Wight, and many parts of Great Britain and Ireland.

The Mangolian family includes the Tartars, Siberians, and Chinese, Esquimaux and Laplanders. The two last, however, appear to be as distinct as the others.

The Hottentot family seem also to be distinct from the Ethiopic race:

The Malayans brown, and skins soft, black hair, head narrow and nose broad at top, large mouth:

Ethiopians or Negroes, black skins, woolly black hair, head compressed

laterally, large black eyes, thick upper lips, and chin falling back:

Native Americans, red copper complexion, hair straight, black eyes, deep, broad face, and flat nose. These are considered as distinct families of the human race, though intermixed in every shade.

The original inhabitants of the European nations were the Celts, Goths, and Sclavonians. The purest Celts are to be found in Wales, Goths in Denmark and Sweden, and Sclavonians in Poland. The former are distinguished by black eyes, black hair, and a deeper complexion. The Goths by light eyes, light hair, and the fairest complexions. The Sclavonians with a browner complexion, dark eyes and hair, and red beards.

The Celts too appear to be distinct from the Goths; perhaps 10 or 12 distinct varieties would be a nearer approximation to truth. Climate is not considered as a competent cause of varieties in the same climate.

Buffon says, of the women of Greenland, that they can suckle their children on their backs, by throwing their breasts over their shoulders; that their nipples are as black as jet, and their skin a deep-olive colour; and that Ethiopians have long flabby breasts, therefore, such as specifically belong to the Hottentot women, are not the effect of relaxation in a warmer climate, but are found with people of colour in the frigid, as well as the torrid zone. No European white woman, however, in any age or climate, was ever known to have a breast of such description.

Blumenbach thus defines man—*order*, bimanum; *genus*, homo; *species*, single with several varieties; *teeth* close and of equal length, with inferior incisors perpendicular, prominent chin; characters, erect stature, reasoning, endowed with speech, defenceless.

The French, says Lavater, have no traits so bold as the English, nor so minute as the Germans. I know them chiefly by their teeth and their laugh. The Italian I discover by the nose, small eyes, and projecting chin. The English by their foreheads and the weakness of their hair. The Germans by the angles and wrinkles round the eyes, and the cheeks. The Russians by the snub nose and their light coloured or black hair.

In diseases the European is the most irritable and the American the most torpid in constitution.

Blumenbach found three varieties among the Egyptian mummies.

The Abyssinians, whose history goes back 3400 years, have dark-olive complexions and long straight hair, though the curly-headed blacks occupy all the tracts in their vicinity.

The Gypsies preserve their family colour in every part of Europe; and the Jews preserve the same complexion though dispersed for 2000 years all over the world.

The form and stature of men differ as much as in the distinct species of animals. The arms, legs, and feet vary, and the stature from seven feet in the Patagonians to 4 to 5½ feet in the Esquimaux, Laplanders, Samoides and Bosjemen, some of which last are not 4 feet. The species intermingle and produce varieties; but the species, to the number of seven or eight, are as distinct as the dog from the wolf, the horse from the ass, or the deer from the antelope. In this conclusion the phrenologists agree with the anatomists, and it is the grave conclusion of the ablest naturalists, as Linnæus, Buffon, Blumenbach, Cuvier, Gall, Haller, Laurence, &c.

Avicenna and other Arabians place the power of reasoning on objects of sense in the brain beneath the forehead, imagination behind it, judgment in the third ventricle, and memory in the fourth. Men judging by their feelings place the animal excitements in the stomach and the reasoning powers in the head. M. Flourens by his experiments proved that the sensations existed in the cerebrum and the will in the cerebellum. Descortis considered the faculty of thinking to be localized in the pineal gland. Anatomy shews that various powers of brains in different animals arise from their relative bulks, or multiplied fibrous convolutions. Physiognomy refers much to the form of the skull, and all common experience judges of mental power by this unanalysed test. Latterly Gall, Spurzheim, Deville, Holm, &c. effect this analysis, and they refer variance of powers and passions to local enlargements. The general principle is little disputed; but doubts are entertained in regard to the details and subdivisions.

The body consists of brain and nerves for sensation, muscles for motion, bones for strength, glands for secretion, arteries and veins for circulation, lacteals and lymphatics for absorption, and lungs for heat and vital energy.

The schools determine in set terms that life is *some* principle of activity added by the will of omnipotence to organized structure, and that to man is added an immaterial soul. Hunter, Lawrence, Abernethy, Morgan, Bichat, Adams, &c. are the last Physiological writers on the subject. But to organized structure is known to be added

atmospheric air, since without it, no principle of life is developed or can be continued, and its principle of activity may be the proximate course of the will of omnipotence in this case as in all others. Life seems therefore to be a result of organic structure and atmospheric air.

Anatomy is the knowledge of the mechanical structure of the parts of the body. *Physiology* treats of the powers by which they produce their results in the living body. *Pathology* treats of diseases and their symptoms, the classification of which is called *Nosology*. *Therapeutics* treat of cure, and medicines to be applied, and includes the *Materia Medica*. *Pharmacy* is the art of compounding medicines, and *Posology* determines the doses.

The human body consists of—

240 bones,
9 kinds of articulations or joinings,
100 cartilages and ligaments,
400 muscles and tendons,
100 nerves;

besides blood, arteries, veins, glands, stomach, intestines, lungs, heart, liver, kidneys, lymphatics, lacteals, and three skins, the epidermis, the rete mucosum, and the true skin, beneath which is the tela cellulosa, distributed through the system, and surrounding every muscle and fibre, every artery, vein, nerve, and lymphatic.

The circulatory system consists of the heart and arteries, and of the veins and lungs. The compression, or systole of the left auricle forces the red blood into the arteries; it is then brought back purple by the veins to the right auricle, compressed by it through the lungs, and reddened and vivified, is passed by the pulmonary veins to the left auricle, which expels it again through the system. Such is the economy of all animals, the greatest and the smallest, the most egotistical and most despised.

The vivification of the blood appears to arise from its chemical combination with oxygen, which thereby parting with its previous motion, that motion received by the blood is animal heat, and the power and energy of the system, or the principle and cause of vitality. The arteries distribute universally and the distinct veins absorb universally, taking up the nitrogen of the air at the skin, and the carbon of the system. Hence the chemical combination in the lungs, expiration of carbonic acid gas, and the restoration of the excitable powers of the blood.

In the ordinary respiration of man, 16 or 17 cubic inches of atmospheric air pass into the lungs 20 times in a minute, or a cubic foot every 5.25 minutes; 274 cubic feet in 24 hours, or a cube of 6½ feet each way. The lungs hold 280, and at each expiration 1.375 of the oxygen is converted into carbonic acid gas; in 63 minutes a cubic foot, and nearly 23 feet in 24 hours. The loss in bulk, per respiration, is but .006 or 0.12 per minute, or only the tenth of a foot in 24 hours. The nitrogen inspired and expired is exactly equal. If then the relative specific heat or atomic motion of oxygen, and carbonic acid, as the mean of Crawford and Dalton, be taken as 3.65 to 1; and the absolute heat of a cubic foot of oxygen as 876°; the difference between inspired oxygen and expired carbonic acid is 688° for every foot in 63 minutes, 0.53° per respiration, or 688° × 23 = 15824° + 87.6°, or 15911.6° in all, for heat and strength in ordinary respiration per day.—*Phillips*.

The stomach converts food into a pulp called *chyme*, and passing into the intestines, *bile* converts it into a milky substance called *chyle*, in which state the lacteal absorbents convey it to the blood near the heart, through which it passes to the lungs and becomes blood.

There are forty-one arteries or great branches which have received names. The *pulmonary* proceeds from the right ventricle of the contracting heart to the air-cells of the lungs. The *aorta* from the left ventricle through the system, and after rising to the first rib, crosses in an arch the thorax and belly, and divides into two. Others are branches of these. The arteries felt behind the wind-pipe are the carotid: the artery which runs over the jawbone, and its branches which supply the lips and face, is the facial or labial artery and a branch of the carotid. The artery felt at the temples is a seventh branch of the carotid, and called the temporal artery. The artery which passes inside of the arm is called humeral.

Bones are composed of gelatinous fibres in net-work, and of earthy salts, as phosphate, carbonate, and sulphate of lime. The gelatine prevails in young animals, and hence their bones are more flexible. In the fœtus the bones are gristly, and ossification commences at their centres. Bones have blood-vessels.

The bones in the head consist of—

1. Frontal or coronal.
2. Parietal.
3. Temporal.
4. Occipital.
5. Sphenoid.
6. Ethmoid.
7. Nasal.
8. Ungual.
9. Cheek.
10. Upper jaw.

11. Palate.
12. Spongy or nnstril.
13. Vomer or nasal.
14. Lower jaw.

There are three sutures, the coronal, the sagittal, and the lamboidal.

The head has 77 muscles.
8 for the eyes and eye-lids.
1 for the nose.
8 for the lips.
8 for the jaw.
11 for the tongue.
11 for the larynx.
11 for the ear.
17 for motions of the head and neck.
1 to move the hairy scalp, and another the eye-brows.

The muscles of the human jaw exert a force of 534 lbs. and those of mastiffs, wolves, &c. far more. The force is produced by the swelling of the muscles in the middle, and dilating again. The entire muscular system to the ground concurring by the vigorous re-action called health. Those muscles which perform involuntary motions, receive nerves from the spinal marrow and cerebrum, and those voluntary from the cerebellum.

New-born infants are 21 inches long, and weigh from 10 to 15 lbs.

Absorbents which convey chyle to the thoracic duct are called lacteals; and those which collect other fluids in the system, and convey them to the same duct are called lymphatics. The lacteals, lymphatics, and their glands, the mesenteric glands, and the thoracic duct, are the absorbent system. The fluids taken up by the lymphatics are prepared by the lymphatic glands; and the chyle is prepared by the mysenteric gland, before either pass into the thoracic duct, situated on the right side, near the first vertebræ of the loins. It ascends to the left side of the neck, and enters the venous system at an angle formed by the subclavian and jugular veins, in the passage of the venous blood to the lungs.

The chest, filled by the lungs, extends from the neck to the pit of the stomach, and is lined with the pleura, a firm fibrous membrane. The lungs are large spongy substances; and the right lung is divided into three lobes, or divisions, and the left into two. They are of lighter colour in youth than age, glossy and elastic. They join the wind-pipe, heart, and spine, but in other parts are free. They are composed of cells, of innumerable ramifications of blood-vessels in the cells for exposure to the inspired air, and of nerves and lymphatics.

The wind-pipe is composed of sixteen or eighteen cartilaginous rings, about the twelfth of an inch broad, and joined by elastic ligaments.

The diaphragm, whose action compresses or dilates the lungs, and on which they rest, is a fleshy partition which divides the chest from the belly. It is arched towards the lungs, but flattens during a strong inspiration, and rises during a strong expiration. The dilating muscles are four, with ten auxiliary, and the contracting are six, with four auxiliary.

The larynx, or organ of voice, is a cavity composed of moveable pieces, twice as large in men as women. Its five cartilages are moved by eight pair of muscles, and fifteen other pairs are connected with its varied powers.

The small intestines are four or five times longer than the whole body of the body to which they belong.

The spleen, of which the use has not been discovered, is found in all vertebral animals. It is always near the stomach, and near the first in those that have several.

The gall-bladder in the human subject is in the shape of a pear, and the size of an hen's egg. It lies on the concave side of the liver. It sometimes forms calculus secretions, which, in passing to the duodenum, create great pain and danger.

The diaphragm is the membrane which divides the thorax from the abdomen.

The diastole is the expansion of the heart, &c.; and the systole is its contraction.

The skeleton of a man weighs from 12 to 16 lbs. and the blood 27 or 28 lbs.

A female skeleton of the same age is smaller than a male. The head, hands, and feet are smaller, the neck longer, the pelvis wider and deeper, and the prominences less.

Seurat, shewn as a living skeleton, was, in 1825, twenty-seven years old. He was five feet seven and a half inches high, and his bones were merely covered with his dry parchment skin. The upper joints of the arms were four inches round. The distance from the chest to the back-bone was but three inches. Round the waist is twenty-three inches. The shoulder blade-bones were scarcely an inch asunder. His appetite was good. The pulsation of the heart was visible to the eye. His ribs resembled pieces of cane. The lungs did not appear to be in the chest, but in the lower abdomen.

In monstrous birth without brains, the functions of vitality proceed.

The human figure is equal to ten faces. One-third from the crown to the forehead; one to the chin; to the pit of the collar-bones two-thirds; from

the pit to bottom of the breast one; from the bottom of the breast to the navel one; from thence to the privities one: to the knee two; the knee half; from the lower part of the knee to the ancle two; and to the sole half:—in all ten. When the arms are extended, the distance of the tips of the longest fingers are equal to the height. From one side of the breast to the other is two faces; from the shoulder to the elbow two; from this to the root of the little finger two. The sole of the foot is a sixth of the height. The thumb equal to the nose. The teats and pit between the collar-bones of a woman is an equilateral triangle. The length of the face and hands is equal. Such are the proportions of painters and sculptors in perfect figures.

The facial angle is the horizontal angle formed by a line, parallel to the bottom of the nose, with another line from the level of the upper jaw to the ridge of the frontal bone. It is

In Europeans from	75 to 85°
In American Indians ...	73½
In Africans	70
In ourang-outangs	65
In monkeys...............	57
In dogs	40
In sheep	30
In a horse	23

The number of teeth at maturity is thirty-two, or sixteen in each jaw. The eight front ones are called cutting-teeth; and the two next on each side are called dog or eye teeth. The two next are two pointed teeth; and the three next on each side are called molares or grinders. The two last are called wisdom teeth, as they are cut last. The four front teeth in each jaw come first in eight or ten months; the four canine or eye teeth in ten months; the sixteen grinders from twelve to fourteen months. At twenty-two or twenty-four years, four other grinders come, making thirty-six. Teeth are phosphate of lime and cartilage, but the enamel is without cartilage. The teeth of an adult have a specific gravity of 2.27, and those of children 2.08.

The brain, under the skull, is invested with the dura mater, a membrane with arteries.

Within the *dura mater*, and adhering to the brain, is the *pia mater*, a very fine transparent membrane, filled with blood-vessels; but a finer membrane lies above this, called membrana arachnoidea.

The brain is called the *encephalon*. Its portions are the *cerebrum*, which occupies the top and front of the skull; the *cerebellum*, which rests on the base of the skull behind, and separated from the cerebrum by a fold of the dura mater; and the *medulla oblongata*, or commencement of the spinal marrow, which projects upward into the centre of the encephalon.

The whole is composed of soft pulpy matter, in various convolutions and prominences.

The brain in the fœtus of superior vertebrated animals arrives successively at the forms in fishes, reptiles, and birds; and the mammiferous modifications are then added.—*Serres.*

The *cerebrum* has three lobes, or round parts; the middle called the corpus callosum: and it consists of two kinds of matter, the outside reddish-grey, and the middle bluish-white and softer.

The *cerebellum* has two lobes, and is of firmer consistence than the cerebrum.

The *medulla oblongata* lies between the lobes of the cerebellum and the middle lobe of the cerebrum, from which it is separated by a streaked medullary part, called the pons varolii.

The *spinal marrow* is a continuation of the medulla oblongata, which, unlike the cerebrum, has the bluish-white outside and the reddish-grey inside. It is divided down the middle, and enclosed by the pia and dura mater.

The four are considered as the common sensorium. The cerebrum being the organ of sensation, the cerebellum of the will, and the medulla oblongata and spinal marrow extending their functions to the system. The weight is nearly four pounds in a male adult, and in the female not so much.

A tenth part of the whole mass of blood is continually in the encephalon.

From various parts of the encephalon, and from the spinal marrow, pass white medullary chords in parallel waving threads, and invested at first with the dura mater, and then with a cellular membrane. They run in pairs; and one is for sense, the other for motion, when both objects are to be effected. They often unite in a knotty cluster, called *ganglions*, which send out more fibres; and some different nerves unite in net-work, called *plexus*.

Nine pairs proceed from the encephalon, and thirty from the spinal marrow.

The Indians west of the Rocky Mountains flatten the heads of their children by compression, for a whole year, and apparently without injuring the functions of the brain.

Modern physiologists divide the vital powers into muscular contractility, nervous agency, sensorial power, and organic affinities.

The prime agent, in animal systems is described to be the cellular tissue, or membranes, which extend through

every part of the body, under various names and functions. It constitutes what is called tone and vigour in the system, which depend on the facility of its contractions.

The cause of muscular contractility has produced numerous theories, with which anatomists have not mingled animal experience, but have regarded the power of muscles as powers *per se*. Nervous agency has also produced numerous theories, the nerves being considered as separate from the general identity of the animal. Sensorial power has also been examined as a property of the substances, and not as a result merely personal.

The most important discovery relative to the nerves has been lately made by Sir Charles Bell, who proves that nerves are not single, and that the combination possesses different powers; two filaments being united for convenience of distribution, while their office and their origin are distinct. The tongue, for example, has nervous papillæ for taste, and others for feeling; one sort communicate pain or feeling, and the other the sense of taste. Sir Charles Bell shews that the nerves which proceed from the front and back of the spinal marrow have totally different functions, though they spread through the system in pairs and in contact. Those which issue from the posterior part might be cut without convulsing the muscles; but the mere touching those from the anterior part produces convulsions. One set he finds to perform the functions of sensation and the will, exquisitely sensible and universally diffused; the other set are connected with the functions of respiration, circulation, secretion, and muscular motion.

The brain itself appears to have distinct functions, like the nerves; the chief part of it may be cut away or removed without affecting the power of voluntary motion, or giving pain, and this part is considered as the cerebrum, which appears to be the organ of sensation; the animal, on its being removed, losing its powers of sensation: while, if the cerebellum, or posterior part, is removed, the animal loses the power of voluntary motion. The organ of feeling in this analysis appears to be the medulla oblongata, and adjoining part of the spinal marrow.

In less complicated animals, Bell found the nerves for different purposes more decidedly distinct than in the higher classes.

In the fœtus, the first part of the nervous system that is formed is the spinal marrow; the upper part of which is enlarged, and the brain succeeds. The sensorial powers are not developed till the frame-work of the body is matured; and their continuance depends on the perfect co-operation of the circulating system.

Gall considers the brain as a collection of distinct organs, the form and expansion of which distinguish the intellectual powers and predominating passions of individuals. Its functions are three—organic, sensitive, and intellectual; to each of these purposes he assigns a particular organ. He divides the parts of the encephalon into twenty-seven organs, in three classes; those of organic life one; those of sensation and perception; and those which relate to reasoning and intellectual energy, on the vertex and smooth part of the forehead, which expands as animals advance in intellect.

In cases where the brain has been removed, there has been no production of heat from respiration artificially kept up.—*Brodie.*

When the nerves to any gland are injured or divided, the secretion of the gland is modified in quantity or quality. *Home.*

Mr. James Blackwell asserts that the heart, lungs, and brain act like an electrometer; the heart, lungs, and blood being the positive side of a galvanic combination; and the brain, nerves, and watery fluids being the negative side. Sir R. Phillips has long taught that the arterial blood is a positive side, and the venous a negative, both meeting in the ventricles of the heart as their pole; and then, considering the pulsations of that organ as the result, he conceives that the energy of the brain is a further result. But Mr. J. Blackwell considers the nerves of motion and sensation discovered by Bell, as another apparatus of like kind, which, by their negative and positive characters, generate the action of the brain.—*Voice from the Desert*, 87—90.

In support of this double action, he imagines that the positive agencies find inlets to the brain by the senses.

In our books of anatomy, the nerves are numbered according to the method of Willis, an arrangement which was made in ignorance of the distinct functions of the nerves, and merely in correspondence with the order of succession in which they appear on dissection.

The *first* nerve of the HEAD is provided with a sensibility to effluvia, and is properly called olfactory nerve. The *second* is the optic nerve, and all impressions upon it excite only sensations of light. The *third* nerve goes to the muscles of the eye solely, and is a voluntary nerve by which the eye is directed to objects. The *fourth* nerve

performs the insensible traversing motions of the eyeball. It combines the motions of the eyeball and eyelids, and connects the eye with the respiratory system. The *fifth* is the universal nerve of sensation to the head and face, to the skin, to the surfaces of the eye, the cavities of the nose, the mouth, and tongue. The *sixth* nerve is a muscular and voluntary nerve of the eye. The *seventh* is the auditory nerve, and the division of it, called portio dura, is the motor nerve of the face and eyelids, and the respiratory nerve, and that on which the expression of the face depends. The *eighth*, and the accessory nerve, are respiratory nerves. The *ninth* nerve is the motor of the tongue. The *tenth* is the first of the spinal nerves; it has a double root and a double office; it is both a muscular and a sensitive nerve.

The *three nerves of the tongue* belong to three distinct functions, and stand related to three different classes of parts. Taste and sensibility belong to the office of the fifth nerve, voluntary motion to the ninth, and deglutition to the glosso-pharyngeal nerve of the tongue.—*Bell.*

If we turn to the opinions which have been entertained on the subject of the brain and nerves, we find one theory to have prevailed from the Greek authors to the time of Willis, and to have descended from him with little alteration, to modern writers. The brain has been supposed to secrete and supply a nervous fluid, and the nerves to be the conduit pipes for its conveyance. In every age the brain has been considered a common sensorium, and all the nerves to be capable of conveying sensation, unless when they had ganglia. If ganglia intervened, then the nerves were said to be cut off from the brain; and those so distinguished were called vital nerves, neither serving the purpose of governing the muscles, nor of conveying sensation. With all this apparent simplicity of doctrine, there never has been presented such a crude heap of errors, in the history of any department of science. These notions were obviously founded on the mistake, that the same nerve served different purposes, and that a fluid moved in the same tube outwards to stimulate the muscles, and inwards to convey sensation of external impressions. So inconsistent are those opinions with the structure of the frame, that the simplest dissection proves them false.

All the nerves, without a single exception, which bestow sensibility from the top of the head to the toe, have ganglia on their roots; and those which have no ganglia are not nerves of sensation, but are for the purpose of ordering the muscular frame. The hypothesis, that the nervous fluid streams out from the great officina along the nerves, has had an unfortunate influence in directing the labours of the experimentalists. During the last age it kept the pupils of Haller engaged in enquiries regarding the influence of the nerves: *de nutritione imprimis nervosa*: and *de nervorum in arterias imperio*; and the interest of this question has encreased. *Bell.*

This notion of a fluid moving backwards and forwards in the tubes of the nerves, equally adapted to produce motion and sensation, has perpetuated the error, that the different nerves of sensation are appropriated to their offices by the texture of their extremities.—*Bell.*

Whatever may be the nature of the impulse communicated to a nerve, pressure, vibration, heat, electricity, the perception excited in the mind will have reference to the organ exercised, not to the impression made upon it. Fire will not give the sensation of heat to any nerve but that appropriated to the surface. However delicate the retina be, it does not feel like the skin. The point which pricks the skin being thrust against the retina, will cause a spark of fire or a flash of light. The tongue enjoys two senses, touch and taste; but, by selecting the extremity of a particular nerve, or what is the same thing, a particular papilla, we can exercise either the one or the other sense separately. If we press a needle against a nerve of touch, we shall feel the sharpness, and know the part of the tongue in contact with the point; but if we touch a nerve of taste, we shall have no perception of form or of place, we shall experience a metallic taste.—*Bell.*

What had been termed the sympathetic system of nerves, Bichat called the ganglionic system; although they are not more distinguishable by ganglia than the other nerves. Bichat persuaded himself that his ganglionic system was isolated, and a thing by itself; when, on the contrary, the connections of this part of the nervous system are universal. The wide-spreading fifth pair, and the thirty spinal nerves, give large and conspicuous roots to this system. It exhibits a tissue extending universally. It was a still more unfortunate mistake to suppose the sympathetic nerve to be the same with that which, in the vermes, is seen coursing from one extremity of the body to the other. In the leech, or worm, those nerves produce union and concatenation of all the voluntary motions, and bestow

sensibility as well as motion; yet he saw in the sympathetic system of the human body, only the developement of the same system of nerves, although he was aware that in man the sympathetic nerve bestowed neither sensibility nor the power of motion.—*Bell.*

The experiments of Le Gallois were of the rudest kind possible. The spinal marrow was cut across, or destroyed, by passing skewers into the spinal canal, and the effects were observed, as though the spinal marrow were a simple body. Whereas, by such destruction of its substance, the original ganglia, which form a series along the spine, must have been hurt; the track of nervous matter which gives rise to the nerves of sensation: that also which gives roots to the nerves of voluntary motion: and the lateral column connected with the offices of respiration, must all have been destroyed by such coarse experiments.—*Bell.*

The most extravagant departure frnm all the legitimate modes of reasoning is the system of Gall. Without comprehending the grand divisions of the nervous system, without a notion of the distinct properties of the individual nerves, or having made any distinction of the columns of the spinal marrow, without even having ascertained the difference of cerebrum and cerebellum, Gall proceeded to describe the brain as composed of many particular and independent organs, and to assign to each the residence of some special faculty.—*Bell.*

To disregard the anatomy of the nervous system, or to take it in the gross; to make a new science of life; and, influenced by a false analogy, to call it *a fluid;* to attempt to direct it along a chord or a wire, is to transgress all the rules of philosophical enquiry.—*Bell.*

Nine pair of nerves issue from the brain, and the other thirty-one from the spinal marrow. The nervous system has an intelligence: which has been considered analogous to the web of a spider, or the net of a fisherman.

Keill estimates the surface of the lungs at 150 square feet, or ten times that of the external body.

That perception, memory, volition, and all the mental phenomena, are in some way associated or dependent for their healthy action on the brain, cannot be for a moment questioned.

Herman Goltz passed many years in anatomical examination of that delicate viscus, the dead brain, endeavouring to discover some coincidence between its marvellous structure and its important uses. To this end, the whole concentrated force of his acute intellect was directed. Sometimes he was elevated by the hope that he had ascertained the source of the reasoning faculty, and the seat in which the passions are generated; but these gleams of success were transient, and were succeeded by total obscurity. At one period, he conceived that he had actually drawn aside the curtain, and beheld the mysterious processes that are performed in the occult laboratory of nature; but he confessed himself deceived, and afterwards cordially acknowledged that the curtain itself was a mere delusion. Exhausted by these sudden alternations of hope and disappointment, the fabric of his understanding gave way, and, in a moment of despair, he hanged himself in his dissecting-room, and was nearly devoured by the rats before his loss was discovered and his fate deplored. Before he accomplished his last resolve, he wrote on a slip of paper these impressive words: " For more than *twenty tedious years* I have pursued a phantom, an *ignis fatuus,* that has decoyed me into ruin and misery. My vision has become so dim, that I can no longer distinguish the objects of my research; my hand is too tremulous to hold the scalpel. Confined in this charnel-house, I have been estranged from Nature's fair and inviting prospects; I have cultivated no man's friendship, nor sought for the affection of woman. I have indeed read of the charms of society, the exhilerations of wine, the delight of a domestic partner, and the blessedness of children: but I have been a solitary student; water has been my only beverage; no females can reproach me with professions, nor can a child curse me for existence. To live longer is useless; the past has been misemployed; the present is wearisome, and I will anticipate the future."

A healthy liver weighs nearly 4 lbs. but diseased ones become four or five times heavier.

The number of ribs vary, being twelve or thirteen on a side.

Vegetable aliments are gum, starch, gluten, jelly, oil, sugar, and acids.

Animal aliments are *gelatine,* or jelly; *albumen,* as the white of an egg; *fibrine,* or muscular fibres; and *fat:* also *blood* and *milk.*

Puberty, in northern climates, commences from 15 to 20, but in India and Arabia from 11 to 14. Age in the former from 45 to 70, and in the latter from 30 to 45.

Riley asserts that Arabs, in the Desert, live 200 years.

Contracting muscles are called *flexor* muscles; expanding muscles *extensor;* the pair *antagonists.*

* Lime combined with phosphoric acid is the basis of bones, and found also in the fluids. Shells consist of carbonate of lime; and hence their remains have been considered as the basis of limestone mountains. Silica and manganese are found in the hair. Iron, with phosphoric acid, constitutes part of the blood.

The fluids of animals contain alkalies, especially soda.

Bone in its solid parts is phosphate of lime, organized by membranes, arteries, veins, lymphatics, and nerves, and in a state of constant change, like the rest of the body. Madder in food stains bones and abstinence restores, and the vessels so palpably convey the matter of bone, that in cases of necrosis, or death of a bone, a new bone is formed as a case to the dead one, which may be taken away when the case becomes a perfect bone in all its functions.

The *brain* and heart are the chief instruments of the lungs, and are alike insensible. The cerebrum may be pressed or cut without pain, and in the time of Harvey, a young man had his heart exposed by a disease, and Harvey handled it without his fingers being felt.

Lymph and serum is common to all *blood;* but in insects it is transparent; in caterpillars green; in frogs yellow; in fish it is red in the vital organs and transparent at the extremities; in man the red particles are too large for some of the vessels, as the coats of the eye, the tendons, and serous membranes. It is deepest red in quadrupeds, and less so in birds, while it varies in some, being deeper in the hare than the rabbit. In animals with a double circulation, the venous blood is a dark Modena red, but the arterial is a light scarlet, and is the fluid on which depends excitement and sustenance. Venous is to water as 1049 to 1000, and arterial as 1052. Disease makes it lighter, but in full health it rises to 1126, and Haller only, says to 1527. In man, its temperature is 98 degrees, in sheep 102, and in ducks 107, and the arterial is higher than the venous. In ague it falls from 98 to 94, and in fever rises to 102 or 105. In man, the red particles are the 5000th part of an inch. In birds larger, more so in reptiles, and larger still in fish, and largest in the skate. The arteries contain more than the veins, and the quantity increases with the temperature. The solid part, after coagulation, is the crassamentum, or clot, and consists of the lymph, or fibrin, and the red particles of which the first is the most important part of the blood, constituting the solid parts of the body and the basis of muscles. On separation, it floats in a fluid called serum or albumen, like the white of an egg. Hunter ascribes life to the blood, that is, that the blood itself is alive! The blood is a fifth of the weight of the body, and three-fourths are in the veins.

The specific gravity of red arterial blood is one-twentieth greater than water. The *serum*, or whey part, is but one-fortieth heavier than water; but the cruor, or coagulated part, is one-fourth heavier than water. The serum coagulates in water nearly boiling; and consists of gelatine, soda, phosphate of lime, and ammonia. The cruor contains subphosphate of iron, and some soda and albumen.

Venous blood is dark or crimson; but restored to its red colour by passing through the lungs.

The heart, by its muscular contraction, distributes two ounces of blood from seventy to eighty times in a minute.

The spinal chord is formed in the fœtus before the brain, and animals are perfect as it is perfect.

The sense of feeling is created by the papillæ of the skin, consisting of small white nervous fibres, which erect themselves when the sense of touch is excited.

The sense of taste by the tongue and palate, by means of nervous papillæ.

The sense of smell is in the nerves of the pituitary or mucous membrane.

The sense of hearing is effected by a mechanism which conveys the vibrations to the internal parts, where nervous fibres are distributed. The drum of the ear is called the *membrana tympanum;* and its vibrations are conveyed to four bones in the internal cavity, which again propagate the vibration to a double spiral cavity, called the *cochlea.*

The eye is an optical instrument. The outer coat is the *sclerotic* membrane. The fore part is the *cornea*, made up of concentric layers. Between this and the former, lies the white of the eye, covered by the *membrana conjunctiva*, that lines the outside of the eye-lids.

Within the sclerotica, and concentric with it, is the *choroid* membrane. At the back part it is perforated by the optic nerve, where it forms the *retina*, which covers the choroid.

About three-fourths of the globe are filled with the vitreous humour, like the white of an egg. In front is the chrystalline lens, convex on each side, but more so inward. It is composed of transparent laminæ, more dense towards the centre. The front is filled with the aqueous humour, in the middle of which floats the iris, or coloured membrane. The specific gravity of the humours is but a 200th more than water; but the

lens one-thirteenth more than water. They consist of water, and albumen, and gelatine. The iris is supplied with blood-vessels and nerves, and is very irritable, contracting and dilating to the light, and appearing to be governed by the retina.

Between the ball of the eye and the vault of the orbit lies the lacrymal gland which secretes tears, and consists of two lobes, with several small canals.

The blind youth who was couched by Chesselden in his thirteenth year, thought scarlet the most beautiful of all colours; but black was painful. He fancied every object touched him. He could not distinguish by sight, objects which he knew by feeling; and was some time learning to distinguish, by his new sense, between the cat and the dog. Those things which he had liked best, were not equally agreeable to his sight; and he had to learn by sight the name of every thing he saw, constantly forgetting and mistaking one thing for another. Pictures he considered as party-coloured surfaces, and he had no idea of the effect of light and shade; a miniature portrait much astonished him, it seemed like putting a bushel into a pint. He could not conceive how the house could look bigger than the room. He said every new object was a new delight. An extensive prospect he called a new kind of seeing. When his second eye was couched, he said he thought objects did not appear so large to this eye as they did at first to the other; and on viewing the same object with both eyes, he said they appeared twice as large. He and others, whom Mr. Chesselden operated upon, described it as learning to see; and, at first, had great difficulty in directing their eyes to an object.

Sir Everard Home couched some young persons with results exactly similar to those of Chesselden. They could not tell the name of any object till they were told what it was, or till they felt it, and had no idea of distances. The blind, however, make up for defect of sight, by the accuracy and sensibility of their touch, and by habits of association between the touch, memory, and judgment. Stanley, the organist, and many blind musicians, have been the best performers of their time; and the blind discriminate sounds at a distance with infinitely greater precision than persons who depend on their visual organs. Miss Chambers, a schoolmistress at Nottingham, could discern that two boys were playing in a distant part of the room, instead of studying their books, though a person who saw them, and made no use of his ears, could not perceive that they made the smallest noise: and in this way she kept a most orderly school. So professor Sanderson could, in a few moments, tell how many persons were in a mixed company, and presently discriminate their sexes by the mere rustling of their clothes. Stanley, and other blind persons, played at cards by delicately pricking them with a pin. A French lady could dance in figure-dances, sew tambour, and thread her needle. The ear, too, guides as to distance, by reflection of sound, and within these few years a blind man, from his infancy, was a surveyor and planner of roads in Derbyshire. When a sense is wanted, the other senses are cultivated with care.

Some blind persons say, they can discriminate colours: others deny the power. Miss M'Evoy, of Liverpool, could read, says Dr. Renwick, by laying glass over a book, and distinguish objects in the street, by feeling on the glass of the window.

Air taken from the pleura after death in a man and dog is found to be .92 and .93 parts of azotic gas, and 8 and 7 of carbonic acid gas. In other cases some oxygen was found, but azotic gas alway abounds in the intestines. Abernethy ascribes it to absorption by the skin.

The colour of the skin depends on the colour of the rete mucosum, a soft gelatinous cellular substance, which lies between the cuticle or scarf skin and the cutis or real skin. In blacks, this membrane contains a black fluid. The blood of blacks and whites is the same colour, and the darkening of the rete mucosum is ascribed by Blumenbach to carbon, and to the increase of bilious secretions in hot climates.

Cases have occurred in America, of negroes becoming white, and after several generations, becoming whiter.

The Indian Archipelago is inhabited by two aboriginal races, intermingled in localities—but brown, though not Tartar, and black, though not African. The first are the Malays, whose language and character prevails from Madagascar to Owyhee, and who are a diluvian race, and the remnant of submerged countries. The second are called Battas, and appear to be the local diluvians of these islands, but far inferior to the Malays.

In speaking, man opens his mouth according to climate, and this creates the distinction between the nasal and gutteral tones of northern languages, and the open tones of southern climes.—*Gardiner*.

There is iron enough in the blood of 42 men to make a plough-share weigbing about 24 pounds.

A man is taller in the morning than at night to the extent of half an inch or more, owing to the relaxation of the cartilages.

The human brain is the 28th of the body, but in the horse but a 400th.

The lungs, owing to the continued local accession of fresh cold air, are the coldest part of the body, and the degrees of heat which they generate is successively carried away by the blood.

The non-naturals are air, food, and drink, sleep and watching, motion and rest, the passions, and the secretions and excretions.

Food is converted in the stomach into a pulpy mass called chyme. It then passes into the pylorus and duodenum, and is converted into chyle, which is taken up by the lacteals, while the mass is passing the intestines, and the excrementitious parts pass through the colon and rectum.

The Englishman's skull averages 7 inches in diameter, and the female 6¾. Yorkshire, &c. averages 7¼; and Scotland 7⅜.

There seems reason to believe, that lines or branches of families wither or cease to have the power of propagating. Records do not exist in regard to obscure families; but the extinct peerage, a class so favourable to propagation, proves the fact. Since Edward III., above seven hundred families have thus ceased to exist; and in the reign of George III., no less than 48 titles became extinct, from the power of propagation ceasing in all the male branches.

As every human being had two parents, these four, and these eight, in three generations, ancestors thus double in every generation of 33⅓ years, and eight-fold in every 100 years; so going back another 100 years, or to 1630, the ancestry of every living person would be 8×8, or 64: in 1530, it would be 8×64, or 512: in 1406, be 4096: in 1330, 32,768: in 1230, 221,344: in 1130, 2,097,152; and at the era of the conquest, the ancestry of every one of the English nation was the whole population of England; while, on the other hand, every one having children at that time was the direct progenitor of the whole of the living race. The race of the year 2503 will in like manner descend from 8 or 9 millions of the present race. In this way the average powers of humanity and of animals are kept up, for without mixture families deteriorate in faculties and become extinct. In one nation the people are all kindred in remote degrees, and have had common ancestry.

It has been computed that nearly two years sickness is experienced by every person before he is 70 years old, and therefore that ten days per annum is the average sickness of human life. Till forty it is but half, and after fifty it rapidly increases.

So great, says Dr. Currie, are the difficulties of tracing out the hidden causes of the disorders to which this frame of ours is subject, that the most candid of the profession have allowed and lamented how unavoidably they are in the dark, so that the best medicines, administered with the wisest heads, shall often do the mischief they were intended to prevent.

If there be any universal medicine in nature it is water; for by its assistance all distempers are alleviated or cured, and the body preserved sound and free from corruption, that enemy to life.—*Hoffman.*

Cullen divides diseases into 4 classes; pyrexiæ, neuroses, cachexia, and locales. These into 23 orders, these into 158 genera, and the genera into various species, 3 or more. The first class includes fevers, inflammations, eruptions, and hæmorrhages. The second, apoplexy, paralysis, vertigo, spasms, and mental diseases. The third class, emaciation, dropsy, and cutaneous. The fourth, defects of sense and motion, discharges, obstructions, tumours, ruptures, &c. Hence the species of human diseases are above 1000 in number.

Dr. Young divides the remedies of the materia medica into four classes; mechanical agents, chemical agents, vital agents, and insensible agents:

1. Air, diet, habits, passions, &c.
2. Caustics, astringents, &c.
3. Excitants, cathartics, &c.
4. Specifics.

A *dispensary* supplies medicine for the poor on application, and superintends the effects at their own houses. An *hospital* receives them as patients, and provides for them as long as medicine can relieve them, and advises in case of personal application as outpatients. An *infirmary* unites the objects of both. But there are NO PUBLIC ASYLUMS for convalescence and virtuous old age.

Vegetable poisons are numerous; the *acrid* are briony root, bitter apple, hellebore, spurge, wolfsbane, meadow anemone, narcissus, and ranunculus. The *narcotic*, as hemlock, henbane, laurel, opium, stramonium, tobacco, coculus indicus, fox-glove, nux vomica or ratsbane, meadow saffron, elaterium, fool's parsley, and fungi. The mineral poisons are arsenic, corrosive sublimate, oxalic acid, sulphuric acid, nitric acid or aquafortis, verdigris, white vitriol, and white lead. Among the

gases, carbonic acid, nitrogen, hydrogen, chlorine, &c.

Diseases of cattle often afflict men who subsist on them. In 1515 and 1578, nearly all the sheep in France perished by a disease resembling the small-pox; and in 1509 the Venetian government, to stop a fatal disease among the people, prohibited the sale of meat, butter, or cheese, on pain of death. The murrain of cattle has a bubo like the plague, and from 1705 to 1714 it spread among cattle, sheep, and horses all over Europe, 5857 dying in Middlesex, Essex, and Surrey; and Europe lost one million and a half. It affected men who eat the flesh, according to Sauvages, destroying at Nismes the tongue in 24 hours, and Paris was similarly afflicted in 1576. From 1740 to 1750, the cattle, &c. were attacked by disease like the small-pox in all parts of Europe, and it was considered as a cause of spreading that disease among the eaters. 300,000 died in the Papal states only. Inoculation was tried, and the vaccine pox is considered as a mild species. In 1764, horses, cattle, sheep, dogs, poultry, &c. died in thousands all over Europe. In Holland only, 208,354.

Vegetables poisonous to man prove innoxious to other animals, while some which men eat with impunity are fatal to some animals. Parsley kills parrots: prussic acid in bitter almonds kills dogs, and some birds: opium and arsenic have a diminished effect on dogs.

The poison so freely administered by Italians in the 17th century was called aqua tofana, from the name of the old woman Tofania, who made and sold it in small flat vials which she called manna of St. Nicholas, on one side of which was an image of the saint. She carried on this traffic for half a century, and eluded the police, but on being taken, confessed that she had been a party in poisoning 600 people. Numerous persons were implicated by her of all ranks, and many of them were publicly executed. All Italy was thrown into a ferment, and many fled, while some persons of distinction, on conviction, were strangled in prison. It appeared to have been chiefly used by married women who were tired of their husbands. Four or six drops were a fatal dose, but the effect was not sudden, and therefore not suspected. It was as clear as water, but the chemists have not agreed about its real composition. A proclamation of the Pope described it as aquafortis distilled into arsenic, and others considered it as a solution of crystallized arsenic. The secret of its preparation was conveyed to Paris, where the Marchioness de Brinvilliers poisoned her father and two brothers, and she, with many others, were executed, and the preparers burnt alive.

The Brunonian system takes its name from Dr. John Brown of Edinburgh, who was born 1736, and died of apoplexy in 1788. He maintained, that disease was chiefly occasioned by debility from want of due excitement; he therefore enforced the utility of increased stimulants, and thus by pampering the appetite and countenancing gluttony, his system for a time was very fashionable.

The mixed and fanciful diet of man is considered as the cause of numerous diseases, from which animals are exempt. Many diseases have abated with changes of national diet, and others are virulent in particular countries, arising from peculiarities. The Hindoos are considered the freest from disease of any part of the human race. The labourers on the African coast, who go from tribe to tribe to perform the manual labour, and whose strength is wonderful, live entirely on plain rice. The Irish, Swiss, and Gascons, the slaves of Europe, feed also on the simplest diet, the former chiefly on potatoes.

Persons apparently drowned, or in whom animation is suspended, should be laid in warm blankets, with the head raised, and hot bricks, or bottles of hot water, applied to the soles of the feet, hands, stomach, and arm-pits; the body and limbs being well rubbed with the hands or warm flannels. The lungs should be inflated by blowing into one nostril, while the other and the mouth are stopt, and action given to the stomach as in breathing; and this should be continued first through one nostril and then through the other, till animation re-appears. A glister, made of salt and some mustard, with warm water, should be administered. Hartshorn or salts may also be applied now and then to the nostrils. On recovery, some weak cordial should be given, and the person put into a warm bed. In cases of strangulation or apoplexy, bleeding should be immediately adopted, and the legs put in warm water. In cases of intoxication or other poisoning, vomiting should be promoted, and an emetic, or the stomach-pump, administered. In cases of persons frozen, friction with snow or cold water is to be preferred.

One-fourth of the deaths in London are from consumption, and one-eighth of the deaths arise from drinking spirituous liquors; which has been greatly increased by legislative measures.

The human race are exposed to

ENDEMIC diseases, arising from local causes, and miasmatous influence; as goitre, plica polonica, marsh ague, dysentery, and swamp bilious fever, &c. To EPIDEMIC diseases, travelling over a greater or less extent of country, as typhus, influenza, plague, yellow fever; these are usually INFECTIOUS diseases, arising from miasmatous effluvia, of a nature as yet unknown, mingling with the atmosphere. The CONTAGIOUS diseases of animal origin, as small-pox, whooping-cough, measles, psora, leprosy, siphilis, rabies, &c. To infectious diseases arising from crowded habitations, scanty food, inattention to cleanliness and ventilation, which render also many diseases infectious that otherwise would not be so; as typhus, dysentery, fevers from filth in cities, from burying grounds, &c. To diseases arising from other nuisances, as unwholesome trades and manufactures, bad water, or a deficient supply of water, &c. Infectious miasmata are often wafted by currents of air to great distances.

Epidemic diseases are not easily prevented, and they are easily confounded with endemics which sometimes become epidemic; but the more cleanly habits, and the knowledge of the present day in the more civilized parts of Europe, have completely conquered the leprosy, the plague, the falling sickness, the sweating sickness, and the jail fever or malignant typhus. Dr. Samuel Jackson, of Philadelphia, has shewn in what way the yellow fever can be imprisoned and circumscribed until it be eradicated. It appears that its miasma do not mount over a perpendicular fence of a dozen feet high, so easily as over an inclined plane 100 feet high.

All infectious and contagious disorders owe their origin to animalculæ; and these have their infancy, their maturity, and their decline. The whole doctrine of equivocal generation requires to be reconsidered. Yellow fever first attacks the stomach, bilious fever the liver; black vomit examined by a microscope, presents a congeries of animalculæ; the bubo of the plague is full of them; so are the pustules of psora. The rot in sheep seems to be owing to animalculæ. If this opinion be well founded, no wonder that a chemical examination of air cannot detect miasma which does not depend on the chemical state of the atmosphere.—*T. Cooper.*

Water after producing successions of animalculæ becomes fœtid. It then affects the lungs, and is deemed the source of pestilential marsh miasmata. *Dwight.*

As to *endemic* diseases, such as the malaria of the neighbourhood of Constantinople, of the sea-coast of Italy, of the Campania di Roma, of the Pontine marshes, the swamps of South Carolina and Georgia, of the Fens of Essex and Lincolnshire, in England, the goitre of the pays de Valais, Pittsburgh, and the coast of Lake Erie, &c. —there is not a fact better established under our constant eyesight, than this, that putrifying vegetable substances in moist and swampy grounds, and receptacles of stagnant water, when the vegetable that has lived and flourished during the summer dies, and is acted on by a hot sun in the months of August and September, produce at that season intermittents and dysenteries in cold climates—bilious remittents in warm climates—and yellow fever or plague in hot climates—the form of plague probably arising from the complication of want of personal cleanliness with the annual sources of yellow fever, as in Egypt and Turkey.

Humboldt states, that a farm on a mountain 3000 feet high near Vera Cruz is exempt from the fatal insalubrity of the whole coast. In marsh miasmata, the fevers which arise on ground or lower stories, do not affect the higher. Rome is healthy 700 or 1000 feet above the marshes. Rome is deemed unhealthy from Easter to November.

The human constitution is not destroyed by heat, but by excessive moisture in the air. Batavia has become healthy since the evergreen avenues have been cut down, and the street-canals filled up. The coasts of Africa and Asia are healthy where open, and destructive when covered by woods and morasses to the sea-side.

Contagion is one of those generic words which like attraction, bewitching, suction, &c. &c. mislead and obstruct enquiry. The differences about it among the faculty are intellectual phenomena. Is not contagion, says Dr. Dwight, such a fermentation of an animal body as generates animalculæ, and hence the danger of contact; and is not exemption after affection, evidence that the germs in that subject have been exhausted? Do we not subsist on such germs, and is not the class of contagious diseases evidence that they have overcome the usual economy of the subject? The generation of animalculæ in our microscopic experiments, proves the universality and indestrusability of their seeds or germs.

Essex, Lincolnshire, Cambridgeshire, Walcheren, Bologna, the Campagna di Roma, Basse-Brenn, Dombes, &c. are

the countries of Europe most exposed to mallaria and to intermittent fevers.

The deaths from small-pox in London in the twenty years previous to the promulgation of vaccination were 36,189; but in the next twenty years only 22,480. In the same periods, in the Small-Pox Hospital, the numbers were 1867 and 814. The frequency of small-pox after vaccination seems to render it necessary to repeat the vaccination in seven or ten years.

Dr. D'Arcet has proved that clothes infected by persons who have just died of the plague, are purified by being steeped in a chloruret of soda.

Lady Mary Wortley Montagu introduced inoculation for the small-pox from Turkey. Her own son had been inoculated with perfect success at Adrianople in 1718. She was allowed to inoculate seven capital convicts, who on recovery were pardoned. The practice was adopted by the enlightened, and therefore spreading the disease, it fatally increased among the vulgar and superstitious, who considered it as interfering with God's providence.

Dr. Jenner made the first experiment in vaccination in May 1796, by transferring the pus from the pustule of a milkmaid who had caught the cow-pox from the cows, to a healthy child; and publishing the result, the practice spread through the civilized world. The power of the cow-pox as an antidote to small-pox was a fact familiar to the common people for a century before Jenner's promulgation of it. The tables of mortality have in consequence been so altered, that the average of life which used to be taken 30 and 33 now approximates to 40.

Previous to vaccination, the deaths from small-pox in London were 4000, or about one in five or six. Since, they have been reduced to an average of 1000, but the deaths from small-pox and cases after vaccination have latterly been on the increase.

Moore considers that the small-pox originated in China about 1120 B. C. and that they invented inoculation for it about 590 A. C.

An Arabian author mentions its appearance in Arabia in 572. In 731 the Saracens spread it and the measles, in Spain and France, and there are Spanish and Italian works upon it in the 11th century. Inoculation travelled from China through India to Turkey.

Infanticide is practised in many countries, but in some of the South Sea islands it is practised systematically by a society called the *Earowies*, which consists of the heads of families, who are bound to destroy their own children. All the voyagers concur in describing this extraordinary association. Two-thirds of the children born in Otaheite are immediately destroyed.

Edward the Confessor was the first king of England who fancied he could cure the king's evil by touching. This vulgar credulity had in the age of Charles II. arisen to such a height, that, in 14 years, 92,107 were touched, and, according to Wiseman, the king's physician, mostly cured!

Caspar Hansar was shut up in a dungeon from four to sixteen. He spoke with difficulty, and like a foreigner. He passed his time sitting in a cell five feet by four, and had food and water brought him. At first he could not walk, and had no idea of his power to move or of moving. The light of day oppressed him. All objects disordered him, but music fixed his attention. At sixteen he had no ideas whatever nor any passions, but on his liberation he learnt rapidly.

The dwarf Jeffry Hudson was 3 feet 9, and Count Borowlaski 2 feet 4 inches.

A female who in 1829 was 42 years of age, and resided at Pynacre near Delph, had, from disease, not eaten any thing since 1818, nor drank any thing since 1820. Total exhaustion was prevented by damp wrappers.

In 1800, a French prisoner at Liverpool exhibited a most extraordinary propensity to devour nauseous diet, particularly cats, of which in one year he eat 174, many of them while alive.

An Esquimaux boy, supplied by Captain Parry, eat in one day 10½ lbs. of solid food, and drank of various liquids 1⅓ gallon. A man of the same nation eat 10 lbs. of solids including two candles, and drank 1½ gallon, yet they were only from 4 to 4½ feet high.

The rapid progress of Temperance Societies, of which 60 are now formed in Great Britain, and others abroad, promises to extinguish the use of the certain poison of ardent spirits, by which the human race are debased and demoralized.—Those societies in 1831 had in six months diminished the consumption of whisky nearly three-fourths of a million of gallons, and in Scotland half-a-million.

In 1810, the Triumph, 74 guns, saved from a Spanish vessel, at Cadiz, about 130 tons of quicksilver, which afterwards ran about the decks. In consequence, the exhalations salivated all the men, killed several, and brought on various obstinate and even fatal diseases. It also killed all the animals on board, rats, mice, &c.

During the last great plague in London, one pit was dug in the Charter House, 40 feet long, 16 feet wide,

and 20 feet deep, and in a fortnight received 1114 bodies. During this dire calamity, there were instances of mothers carrying their own children to these public graves; and of people delirious, or in despair, for the loss of friends, who threw themselves alive into these pits.

The grain on which man chiefly subsists is rice, wheat, maize, barley, oats, and rye.

Such is the force of education, and so much are men what the habits of infancy make them, that in spite of the conceits of the English when Florida was ceded to England by a treaty with Spain in 1769, the whole of the Spanish population left the province and towns except one in a single town and another single in the woods. The same feeling was exemplified by some inhabitants of Nova Zembla, who on being brought to Denmark and clothed and fed with every luxury of civilization, so pined for their return to their own inhospitable desert that some of them died before they could be sent back. Something like this strong principle doubtless governs birds and animals in their return to their native haunts.

Vegetable aliment, as neither distending the vessels, nor loading the system, never interrupts the stronger action of the mind; while the heat, fullness, and weight of animal food is adverse to its vigorous efforts.—*Cullen.*

You ask me for what reason Pythagoras abstained from eating the flesh of brutes? for my part, I am astonished to think what appetite first induced man to taste of a dead carcase; or what motive could suggest the notion of nourishing himself with the loathsome flesh of dead animals.—*Plutarch.*

Nothing can be more shocking or horrid than one of our kitchens sprinkled with blood and abounding with the cries of creatures expiring, or with the limbs of dead animals scattered or hung up here and there. It gives one the image of a giant's den in romance, bestrewed with the scattered heads and mangled limbs of those who had been slain by his cruelty.—*Pope.*

Anthropophagi, or feeders on human flesh, have existed in all ages, and still exist in Africa, and the South Sea Islands. Diogenes asserted, that we might as well eat the flesh of men as the flesh of other animals. The Greeks inform us it was a primitive and universal custom. Some of their Gods lived on human flesh, and the Cyclops did the same. Aristotle and Herodotus name various nations who preferred human flesh to that of animals. The Giagas, and several African nations, have the same preference; and we all remember the practices at Owyhee, New Zealand, &c. &c. Human flesh has the flavour of hogs-flesh, and the tenderness of the flesh of calves.

Forbes states that the Europeans who die in India are to those who return as 83 to 1.

Quarantine was contrived by the Venetians in 1437.

Embalming in Egypt often cost persons of note a talent of silver, or 137*l.* 10*s.* Vicious and criminal persons were not allowed to be embalmed, and the character of the dead was first formally investigated.

Voltaire says, that, in 1725, he saw 4 savages from the Mississippi, 1 of whom, a female, admitted that she had eaten men; but contended that victors ought to have the preference over wild beasts.

St. Jerome states, that he saw Scotchmen in the Roman armies, in Gaul, who fed on human flesh, as a delicacy, as often as they could get it.

The common definition of man is false; he is not a reasoning animal. The best you can predicate of him is, that he is an animal capable of reasoning.—*Warburton.*

Of all wretchedness that of persons charged with insanity is the greatest, since those who are entrusted with the care, are interested in continuing the disease, or in reporting its continuance; and checks on abuses are themselves always rendered inefficient by apathetic indifference or artful misrepresentation.

The perception of a woman is as quick as lightning. Her penetration is intuition; almost instinct. By a glance she will draw a deep and just conclusion. Ask her how she formed it, and she cannot answer the question. A philosopher deduces inferences; and his inferences shall be right; but he gets to the head of the stair-case, if I may so say, by slow degrees, mounting step by step. She arrives at the top of the stair-case as well as he; but whether she flew there is more than she knows herself. While she trusts her instinct she is scarcely ever deceived, but she is generally lost when she begins to reason.—*Sherlock.*

The Biddenham maids, born in 1100, had distinct bodies, &c. but were joined by the hips and shoulders. They lived to be 34; and one dying, the other refused to be separated, and died in a short time. They left twenty acres to the poor, still distributed in bread every Easter Sunday.

A more recent case of like kind is that of the Siamese or Chinese youths shewn in London. They are joined by a band of cartilage and skin at the stomach, from two inches and a half to four inches long, and eight inches

round, are healthy and cheerful, and one in body, inclinations, and habits. The band of union is considered as an enlargement of the umbilical cord. There is no nervous connexion through the band, and their sympathy of feelings appears to be the result of habit from infancy to maturity. When both cough, the band is distended like a chronic hernial sac. The abdominal cavities appear to communicate and to have but one peritoneal lining; but the viscera are distinct. At the exact line where one begins to feel the other ceases to feel, and there is no point where both feel. They had a fever together, but not equally great, and both had a cold at the same time. Their evacuations are made together. They go to sleep together and wake together exactly. They play at chess, and differ in ideas about moves—but in habits they are alike, and different in body, though they grew upon one placenta by one umbilical cord.

The late blind Justice Fielding walked in my room, for the first time, when he once visited me, and, after speaking a few words, said, "This room is about twenty-two feet long, eighteen wide, and twelve high:" all which he guessed with the greatest accuracy by the ear.—*Darwin.*

Most animals live in amity, but man is the enemy of all; and, unlike those ferocious creatures who kill from motives excited by want and hunger, man kills every thing for sport, aversion, fear, superstition, wantonness, and often for the mere sake of seeing that dead which was living in enjoyment. In consequence, he destroys the natural circle of existence, and reduces countries which he inhabits to deserts, like the once fertile kingdoms of Assyria, Babylonia, Nineveh, Judea, Syria, &c.

About the age of thirty-six the lean man usually becomes fatter, and the fat man leaner. Again, between the years forty-three and fifty, his appetite fails, his complexion fades, and his tongue is apt to be furred upon the least exertion of body or mind. At this period his muscles become flabby, his joints weak, his spirits droop, and his sleep is imperfect and unrefreshing. After suffering under these complaints a year, or perhaps two, he starts afresh with renewed vigour, and goes on to sixty-one or sixty-two, when a similar change takes place, but with aggravated symptoms. When these grand periods have been successively passed, the gravity of incumbent years is more strongly marked, and he begins to boast of his age.—*Waterhouse.*

The grand climacteric in human life varied between sixty and seventy; and was an astrological period, which depended on the revolutions of Jupiter and Saturn, five of one and two of the other making the climacteric age. By the English law, infancy in males extends to twenty-one, and in females to twenty; but the ancients extended the period of adolescence to twenty-five.

Total abstinence above seven days is fatal to man; but there are instances of surviving after a longer period. A religious fanatic, in 1789, determined to fast forty days, but died on the sixteenth.

Rachael Hertz, of Copenhagen, had, between Feb. 1819 and July 1822, 395 needles extracted from tumours in all parts of her body; the breasts, the navel, the thighs, lumbar region, &c. She had for fifteen years been variously diseased, and was supposed to have swallowed the needles in fits of delirium.

The quantity of pure water which blood, in its natural state, contains, is very considerable, and makes almost seven-eighths thereof.—*Macquer.*

The Indians destroy their deformed children. Their skins are very thick. They have no beards or hair, except on their heads, for they pluck it out as it appears with split sticks.

The Esquimaux are but four feet high, in the north of the American continent; while the Patagonians, in the south, are rather taller than Europeans, and an athletic race. The men are from five feet ten inches to six feet six inches; and measure four feet round the chest, and nearly as much round the pelvis.

Dr. Duffenbach of Berlin, ingrafted the feathers of black chickens into a white pigeon, and the contrary, the feathers of chickens, &c., into rabbits, &c.; bristles of cats into pigeons; the eye-brow of a friend on his own arm; the claw of a pigeon on its rump; and they all took root and grew. He also scalped a pigeon, and transferred a new scalp from the thigh; and he cut off a rabbit's nose, and sewed it on again with success. All this resembles the Talicotian nose, produced in London by Carpue from the forehead.

Near-sighted persons are called myopes. Their eye is too convex. A concave glass corrects the defect; just as a convex glass enables us to see nearer by converging the rays.

Richter enumerates 600 distinct species of disease in the eye.

Among the mammalia, man only has but one thumb.

The atoms composing a man are believed to be changed every forty days, and even the bones in a few months.

The pulse of children is 120 in a mi-

nute; at puberty it is eighty, and at sixty only sixty.

Sanies is the thin serous of wounds. Pus is the secretion of inflammation and its termination.

Dr. Lamb infers from the teeth, stomach, and intestines of man, that his natural food is vegetables. Other anatomists have maintained the same opinion, and many philosophers, in all ages, have proved the advantages of vegetable diet in their continued good health and extraordinary longevity. Pope ascribes all the bad passions and diseases of the human race to their subsisting on the flesh, blood, and miseries of animals. Many thousands in England now live by choice on vegetables; while the Irish, Scotch, and most of the labouring classes do it from necessity, and enjoy health and vigour, except when they indulge in spirituous liquors.

Dr. Lettsom ascribed health and wealth to water, and happiness to small beer, and all diseases and crimes to the use of spirits: making of the whole, a moral thermometer. The Abbé Gallani ascribes all social crimes to animal destruction, thus treachery to angling and ensnaring, and murder to hunting and shooting; and he asserts "that the man who would kill a sheep, an ox, or any unsuspecting animal, would kill his neighbour, but for the law."

Boerhaave describes eight temperaments, the warm, cold, dry, moist, bilious, sanguineous, phlegmatic, and melancholic. The ancients divided men into the airy, the fiery, the plegmatic, and the earthy; or the sanguineous, the choleric, the moist, and the melancholic. Reece assigns seven constitutions, as connected with disease: the sanguineous, or inflammatory; the phlegmatic, or relaxed; the erysipelatous, or nervous; the hypochondriacal, or spasmodic; the scrofulous; the rheumatic; and the arthritic, or gouty.

Reece enumerates 220 drugs in general use in the relief or cure of diseases. The chief part are derived from the vegetable kingdom; and there are five preparations of steel, three or four of mercury, one of tin, two of sulphur, four of nitre, and twenty or thirty chemical products, as quinine, murphine, iodine, prussic acid, &c.

As the animal system does not admit of two excitements at the same time, most morbid affections are relieved by new excitements; and these abating, the disease abates, and is often cured. This is called sympathy, and the stomach and brain appear to be the common centre of it.

Baths at Algiers.—The bather passes into a chamber, where he is exposed to a moderate heat, in order that he may be the better prepared for the excessive heat which he is shortly to endure. In the large saloon the heat is so intense that perspiration flows through the napkins. From it you are conducted into a closet; and you are stretched on a woollen cloth, placed on cushions, and are delivered up to two strong negroes. They scrape the soles of the feet, and after this, wrap their hands in some camels-hair cloth, and scrub the body. Whilst this is going on, warm water is poured over you, and then your head is placed under a spout, in order that you may be drenched with a deluge of hot water. The negroes next dry and rub the body with a sort of hot clay. The bather then undergoes a fresh ablution, and after this treatment the negroes seize him behind by the shoulders, clap their knees against his loins, and make his joints crack.

The same medicines, says Reece, have contrary effects primarily and ultimately, and as applied to different functions of the system. Thus opium is at first stimulating, and then sedative. Cayenne and black pepper are inflammatory stimulants of the skin, but remove inflammation of the palate. Turpentine excites the skin, but operates as a sedative in puerperal fever and on the kidneys. Digitalis diminishes the action of the heart and arteries, and increases that of the absorbents. So with others.

Arsenic and acid solutions of mercury, copper, lead, antimony, &c. are active mineral poisons, for which sulphur and salt of wormwood, or charcoal, are the best antidotes next to the stomach syringe.

Reece relates that a leech of 3 drachms takes $3\frac{1}{2}$ of blood, and as much more escapes after. Those of smaller size in less proportion; so that 24 large leaches take 17 ounces, and 24 small ones but 3.

Vinegar boiled with myrrh or camphor, and sprinkled in a room, corrects putridity. Smyth's plan was, to heat half a tea-cup of vitriolic acid in a vessel of hot sand, and stir into it some powdered nitre, till the room is filled with nitrous vapour. The chlorurets of sodium and calcium have lately been adopted.

The marks used in pharmacy for different weights are as under:—

℔*j*. . . . . a pound or pint.
℥*j*. . . . . an ounce.
℥*ss*. . . . . half an ounce.
ʒ*j*. . . . . a dram.
ʒ*ss*. . . . . half a drum.
℈*j*. . . . . a scruple.
℈*ss*. . . . . half a scruple.
gr.j. . . . . a grain.

A receipt is so called because it begins with that word, or its initial R, signifying *take*.

If for manhood a dose is a dram, in youth it is half; at four it is fifteen grains; at one year five grains; at one month one grain.

A tea spoonful is a drachm; a table spoonful half an ounce; a wine-glass two ounces; a tea-cup three ounces; a pint is a pound. A drop is a grain or minim; and sixty are a drachm. In prescriptions, *m* stands for minim; *a* or *ana*, for, of each; *ss* the half; *cong.* a gallon; and *cochl.* a spoonful.

Drugs are weighed below a drachm, in three scruples or sixty grains; but above a drachm by avoirdupois weight, and compounded by troy weight. Wine measure is also used.

THE ANIMAL KINGDOM.

The process of nature seems to be the formation of atoms into gases by resulting orbit motions. The re-fixation of these generates mineral compounds; the formation of vegetables then arises from gases and minerals; and the formation and sustenance of animals result then from gases and vegetables prepared from minerals. Atoms seem to be the bases of gases; gases and solid carbon are the bases of minerals; minerals and gases are the bases of vegetables, and vegetables, or prepared minerals and gases, are the bases of animals. Some voracious animals in northern climates where vegetation is scarce, and habits cruel, devour one another, but this is not the order of nature.

The *monas*, a water hydatid or viscid bubble, is the first germ of animal secretion, or stomachic absorption, which indicate irritability. When found in man and animals they are called *bots*.

Animals universally are organizations, which are able to fix or appropriate the motions of the atoms of the gases that constitute the atmospheric air. The air in being converted from oxygen and nitrogen into carbonic acid gas and nitrogen, by the galvanic or antagonist chemical action of the lungs, loses a portion of its atomic motion; and this being imparted to the blood, is by it transferred to the system conferring the energies of life. It is a process exactly similar to combustion, but no flame appears, owing to the excess of fluids in the system. The motions of the earth 50 times that of a cannon-ball, and the action of the solar rays create the gases which constitute the atmosphere, and their elasticity is the varied expansion of their orbits. Animals live within this world of atoms in such intense motion, and the functions of life consist in respiring them, fixing certain of them, and displaying the results in their own bodies by activity, sensation, and all the various phenomena of life.

Animal organization consist of ten classes, depending on their bony structure, their warm or cold blood, their mode of rearing their young, lungs or gills, and having bony or no bony parts.

1. Mammalia have a double heart and warm blood, with an internal bony skeleton and brain, and they suckle their young.

2. Birds have the same, but do not suckle their young.

3. Reptiles have lungs, and jointed or divided members, but a single heart and cold blood, with a brain and cartilaginous skeleton.

4. Serpents have lungs, and a single heart and cold blood, but no jointed members, with a brain and skeleton.

5. Fishes have gills and fins, and no lungs, with a single heart and cold blood, with a brain and bony or cartilaginous skeleton; and no jointed or articulated members.

All those having vertebræ, are called Vertebral Animals.

But the following have no internal skeleton, and no brain, as—

6. Crustacea, with articulated members, and a circulatory system, with gills or branchiæ.

7. Insects like the former, but with trachiæ and no circulating system.

8. Mollusca, with simple nerves;

9. Worms, with knotted nerves.

10. Zoophytes, with no nerves and no vessels, but without articulated members, and no skeleton or brain.

The last five are, therefore, called Invertebral Animals.

The Linnæan Arrangement embraces Minerals, Vegetables, and Animals, in Classes, Orders, Genera, Species, and Varieties, with names and characters.

In Animated Nature he has six classes, consisting of

Mammalia in 7 orders, 47 genera, and 577 species;

Aves, 6 orders, 90 genera, and 2641 species;

Linnæus distinguishes Birds into six orders; *Accipitres*, angular projecting beaks; *Picæ*, compressed beaks, with climbing feet; *Ansares*, beak with skin, and broad at end; *Grallæ*, with three or four toes; *Gallinæ*, convex bill and arched upper mandible; *Paperes*, conic, and pointed bills.

Amphibia, 2 orders, 19 genera, and 366 species;

Pisces, 6 orders, 66 genera, and 889 species;

INSECTA, 7 orders, 131 genera, and 10,896 species;

And VERMES, 5 orders, 118 genera, and 4036 species.

In all 19,405 discribed species.

Two millions of species of terraqueous animals and plants are believed to exist. There are at least 100,000 species of plants and 400,000 of insects. The species in the seas are believed to be far more numerous. The nomber of Polypes exceeds that of other insects, and the infusoriæ are not nombered, nor are the parasitic tribes. The species of the whole may be five millions, so that if an old species became extinct, and a new one were evolved once a week, the whole would be changed in not less than 100,000 years.

Humboldt makes the species of insects 41,000, of fishes 2,500, reptiles 700, birds 4000, and of mammiferous animals 500.

Adanson's great work on Natural History contained an arrangement of 40,000 species, with a vocabulary of 200,000 words, and 70,000 figures drawn from the three kingdoms of nature.

The infinite variety in the forms, habits, and porposes of insects claims for them the primary consideratioo of all naturalists.

In 1780, Drury formed a museum of 11,000 species of insects, giving sixpence for all that might be brought him. It was afterwards sold for £600.

Donovan's valuable work on British Insects extends to eighteen volumes.

P. Martin poblished an accoont of 500 species of coleopterous Insects found in England. Francilec collected 2000 species of the genus scarabacus.

Jones, in 1794, announced a history of the genus papilio, in which he professed to describe 1400 species.

INSECTS are divided by modern entomologists into 680 genera, and every genus into many species. The study of each genus, its habits, economy, and wonderful ingenuity, according to its powers and the sphere of its existence, has afforded employment for years; and this branch of nature alone is so infinitely varied as to render the lives of many indefatigable men uneqoal to its perfect knowledge.

Linnæus adopted five orders, defined by the wings—1. Coleoptera, with covered wings; 2. Angioptera, uncovered wings; 3. Hemiptera; 4. Aptera; and, 5. Vermes. This system he afterwards varied as follows:—

Order 1, Coleoptera, as beetles.

Order 2, Hemiptera, as bugs, locusts, and cock-roaches.

Order 3, Lepidoptera, as butterflies and moths.

Order 4, Neuroptera, as dragon-flies.

Order 5, Hymenoptera, as bees and saw-flies.

Order 6, Diptera, with two wings, as gnats, flies, gad-flies, &c.

Order 7, Aptera, without wings, as fleas, lice, spiders, mites, centipedes, crabs, &c.

Leach divides insects into 15 orders:

SUBCLASS I. AMETABOLIA.

Insects undergoing no metamorphoses.

ORDER I. *Thysanura.* Tail armed with setæ.

ORDER II. *Anoptura.* Tail without setæ.

SUBCLASS II. METABOLIA.

Insects undergoing metamorphoses.

CENTURY I. *Elythroptera.* Insects with elytra.

COHORS I. *Odontostoma.* Mouth with mandibles.

Metamorphoses incomplete.

ORDER III. *Coleoptera.* Wings transversely folded; elytra crustaceous, covering the wings, with the suture straight.

Metamorphoses nearly coarctate.

ORDER IV. *Strepsiptera.* Wings longitudinally folded; elytra coriaceous, not covering the wings.

Metamorphoses semi-complete.

ORDER V. *Dermaptera.* Wings longitudinally and transversely folded; elytra somewhat crustaceous, abbreviated, with the soture straight.

ORDER VI. *Orthoptera.* Wings longitudinally folded; the internal margin of one elytron eovering the same part of the other; elytra coriaceous.

ORDER VII. *Dictuoptera.* Wings longitudinally folded twice or more; elytra coriaceous, nervous, one decussating the other obliquely.

COHORS II. *Siphonostoma.* Mouth with an articulated rostrum.

ORDER VIII. *Hemiptera.* Elytra somewhat crustaceous, or coriaceous; towards the apex generally membranaceous, horizontal, one decussating the other obliquely. Metamorphoses half complete.

ORDER IX. *Omoptera.* Elytra entirely coriaceous, or membranaceous, and meeting obliquely, with a straight suture. Metamorphoses semi-complete, or incomplete.

CENTURY II. *Medamoptera.* Insects without wings or elytra.

ORDER X. *Aptera.* Mouth with a tobular sucking rostrum. Metamorphoses incomplete.

CENTURY III. *Gymnoptera.* Insects with wings, but no elytra.

COHORS I. *Glossostoma.* Mouth with a spiral tongue.

ORDER XI. *Lepidoptera.* Wings foor, membranaceous, with peterigostea, covered with meal-like scales.

COHORS II. *Gnathostoma.* Mouth with maxillæ and lip.

ORDER XII. *Trichoptera.* Wings four, membranaceous, with peterigostea, and hairy.

COHORS III. *Odontostoma* Mouth with mandibles, maxillæ, and lip.

ORDER XIII. *Neuroptera.* Four highly reticulated wings, generally equal in size; anus of the female without a sting, or compound borer.

ORDER XIV. *Hymenoptera.* Four venose wings, hinder one smallest; anus of the female with a sting, or with a compound borer or oviduct.

COHORS IV. *Siphonostoma.* Mouth tubular, formed for sucking.

Order XV. *Diptera.* Wings, and halterers or balancers two.

The instincts of animals are their habits and practices resulting from their varied forms and natural powers. They fly, swim, crawl, run, &c. and eat and locate agrceably to their respective experienced convenience, and the young universally follow the habits of their parents, and education becomes their nature, generating peculiarities in each kind. They thus replenish the earth, promote its intense fertility, and become useful and necessary parts of a general circle of organic life.

All animals display varied and strong Intelligence, but we notice most those acts which resemble our own. Thus, the species of the motacilla, called the tailor-bird, astonishes by sewing two leaves together with vegetable fibres as with a needle and thread, for its nest. The nightingale, wren, robin, &c. are other species of motacilla.

MAMMIFEROUS ANIMALS are divided into unguenlated with nails, unguenlated with hoofs, and nectopode or web-footed. The first order is man, or *homo;* the first family of the second order is the *simia* or monkey tribe, in 9 genera, and many species.

Size of Mammalia.

Man—4 to five feet in Lapland and Labrador, $5\frac{1}{4}$ to $6\frac{1}{4}$ in Europe and Asia, 5 to $5\frac{3}{4}$ in Africa and America, and 6 to 7 feet in Patagonia.

Ourang-Outang	$4\frac{1}{2}$ to $5\frac{1}{2}$ feet
Pigmy apes	2 ,,
Four-fingered	$1\frac{1}{2}$—tail 2 ,,
Striated monkey	5 inches
Vaulting monkey	13 ,,
Malbrook	$1\frac{1}{2}$ feet
The Barbary ape	$3\frac{1}{2}$,,
The sphinx	3 or 4 ,,
Dog-faced baboon	5 ,,
The preacher	$3\frac{1}{2}$,,
The lemur	1 foot
Vampire	6 to 12 inches
Common bat	4 or 5 ,,
Spectrum bat	7 inches
Hedgehog	10 ,,
The shrew	$2\frac{1}{4}$,,
Mole	6 ,,
Badger	$2\frac{1}{4}$ feet
Glutton	$2\frac{1}{4}$,,
Ratel	2 ,,
Racoon	2 ,,
Ichneumon	15 inches
Weasel	$7\frac{1}{4}$,,
Ferret	14 ,,
Martin	18 ,,
Ermine	10 ,,
Sable	11 ,,
Polecat	17 ,,
Zurillo	17 ,,
Otter	$3\frac{1}{4}$ feet
Lion	6 to 8 and 9 ,,
Lioness	5 to 6 and 7 ,,
	Tails 3 feet, height 3 to 5 ,,
Tiger	8 to 9 ,,
	Tail 4 feet, height 4 ,,
Wild cats	2 to 5 ,,
Lynx	4 ,,
Civet	2 ,,
Hyena	3 ,,
Fennec	10 inches
Wolf	$2\frac{1}{2}$ to 3 feet
Fox	$1\frac{1}{2}$ to 2 ,,
Jackall	$2\frac{1}{4}$,,
Opossum	15 to 18 inches
Wombat	2 feet
Kangaroo	3 to 4 ,,
Flying squirrel	6 inches
Ordinary squirrel	8 ,,
Jerboa	7 to 8 ,,
Dormouse	6 ,,
Marmot	10 ,,
The porcupine	$2\frac{1}{4}$ feet
The ant-eater	12 inches
	Spines 4 feet
Great ant-eater	4 ,,
The pangolin	6 or 8 ,,
The armadillo and tail	5 ,,
The elephant	10 or 11 ,,
	8 to 10 feet high
The tapir	6 feet
The rhinoceros	12 ,,
	6 to 7 feet high
The hippopotamus	12 to 20 feet
The dromedary	6 or 7 ,,
	9 feet high to top of head
The lama	6 feet
The musk deer	$3\frac{1}{4}$,,
The stag	4 to 5 ,,
Roebuck	$3\frac{3}{4}$,,
Rein-deer	4 to 5 ,,
Giraffe	15 or 16 feet high
The chamois	3 feet
The antelope	$3\frac{1}{4}$ feet
The pigmy antelope	10 inches
The bottle-nosed seal	11 to 18 feet
Ursine seal	6 to 9 ,,
The maned seal	10 to 14 ,,
The common seal	4 to 6 ,,
The walrus or morse	15 to 18 ,,
Manati	20 to 28 ,,
The Siren	5 ,,

Modern classification dnes not rank Cetacious animals as fishes, though they live in the sea. They suckle their young, and, therefore, are classed with man, &c. among mammalia. Their heads are large, and they have little or no neck. Their eyes are very small and backward. The tail is horizontal, and they have swimming paws, analogous to the fore-feet of seals. A single stroke with the tail of a whale will cut a boat in two; and they move in the sea above a mile in a minute. The stomach consists of four or five successive cavities. They live chiefly on other species of fish. The aorta of whales is thirteen inches in diameter. The blow-holes are nostrils at the top of the head to inspire air; and the blow-holes are so contrived as to enable it, at pleasure, to eject the water that enters the mouth. A large whale can form a jet forty feet high. Their structure is as anatomically curious and perfect as that of other mammalia, and they merit the respect and sympathy of man. In general they are black. Those of Spitzbergen are white. The balænæ, or common whales, are often sixty feet long and thirty round. Instead of teeth they have whalebone plates, with hairy borders hanging from the upper jaw. The females are most affectionate to their young; and when assailed and wounded by the avaricious mariners who frequent their seas, their care of their young ones often draws tears from every eye-witness who is not capable of midnight murder. This class includes—

The common whale and Iceland whale	60 feet
Finned whales	50 ,,
Nor-whales	21 ,,
Spermaceti whale	60 ,,
Dolphins	25 ,,
Porpoises	6 ,,
Grampusses	20 ,,
Beaked whale	24 ,,

The great whale is a very harmless animal, and has neither the habits nor the conformation of fishes. They have no teeth and very narrow gullets. Their horizontal tail, and the suckling of their young, bring them within the class of land animals. The barbarous practice of killing them for gain has thinned their numbers, and also driven them from their usual haunts so that avarice is often disappointed.

The whale whose skeleton has been shewn at Charing Cross, was 95 feet long and 18 broad, with 22 feet of head. When found dead, it weighed 49 tons, and the skeleton weighs 35 tons. It yielded 4000 gallons of oil. It was estimated to have been 90 or 100 years old. Whales generally caught are from 40 to 58 feet, and yield 30 tons of oil. The tail is 4 or 5 feet long, and 20 feet broad, with great power and activity.

Whales appear to pass from the Greenland seas to the Pacific, as is proved by harpoons found in them.

There are nineteen species of that half-human inhabitant of the sea called seals. They are even more like men than monkeys are, and live in social communities, and display great sagacity and mutual affection. The females are specially interesting in their duties to the young; and among some species but one male and one female cohabit, while in others polygamy is practised with regular family government. For the sake of oil, man is their merciless destroyer. The smaller species are called sea-calves, and the larger, or ursine, sea-horses. They are often mistaken for the fabulous creature the mermaid.

The poor seals have found advocates in the phrenologists, the size of their brains indicating extraordinary intelligence, and their docility being interesting to students in that art.

The ursine seals live in communities, every male having ten or twelve females, protecting his own family, and preserving social intercourse, with great interest and sagacity.

Young elephants and females have no tusks, but are often killed in wantonness. The teeth imported have generally heen found in the woods. Elephants are from nine to twelve feet high. They swim with ease, and live on vegetables. They respire and eat and drink thruugh the trunk, which is so sensible as tu pick up a pea or a pin. The young are three feet high, and the female seldom has twins. They grow for 30 nr 40 years, and live 200 or 300, some say 400 years.

The tusk or tooth of the male elephant, harder than horn and less brittle than bone, weighs from 120 to 200 lbs. and is brought from Ceylon and Africa. 100 parts contain 24 gelatine, and 64 carbonate of lime.

An elephant bred to war stands firm against a volley of musquetry, and 30 bullets in the flesh will not kill them. They eat about 30 lbs. of grain per day, besides sweets, of which they are fond. They are docile, grateful, intelligent, and most careful creatures.

Female elephants assist the hunters with great address in making captive the wild elephants.

Elephants, in swimming, are only careful to keep the point of their trunk above the water.

The rhinoceros is twelve feet long, with a horn three feet, and a skin so hard as to turn a sabre. They are soli-

tary, and harmless, living entirely on vegetables.

One species of rhinoceros, in Africa, has a horn like a cock's-spur, rising nine or ten inches, and behind a short thick horn; but another has a horn three feet long, like the unicorn, with a thick horny substance behind it.

The behemoth of the Jews was either the hippopotamus or mammoth, said in the Talmud to feed on a thousand mountains in a day; a speed which accords with the Indian tradition about them, and with that of the great and terrible dun-cow of Dunchurch.

Under the genus Felis, Linnæus classes the lion, tiger, panther, leopard, ounce, ocelot, cat, serval, lynx, and caracal.

The European wild cat is not considered as the original of the domestic cat, but a Nubian which passed through Egypt into Europe. The Angora cat has one eye blue and the other yellow.

Bats in India are called flying foxes, and measure six feet from tip to tip.

Bats have two pectoral teats and a thumb separated from the fingers. They fly, but they have neither feathers nor beak; they are covered with hair, and have teeth. They breed living young and suckle with teats. Their wings are the drapery of their bodies, except when they stretch them to fly. They fly in the dark, and avoid objects not by seeing but by some sense.

There are four classes of apes or simia, called apes, baboons, monkeys, and japajocs, in 63 species. The ourang-outang walks erect, and is often six feet high and very powerful, capable of imitating all the habits of man. The Barbary ape is known for his agility as an object of exhibition. The great baboon and dog-faced baboon are nearly 4 feet, and the preacher monkey, from a tree harangues, or howls, at monkey auditors. They all live on fruits and vegetables, and are harmless unless attacked.

The Angola ourang, *simia troglodytes*, is the nearest approach to man, and far more perfect than the *simia satyrus* or ourang-outang, which in running goes on all-fours.

In Borneo, Sumatra, and on the Oroonoko, baboons and monkeys are employed to climb trees, and gather ripe fruit.

Monkeys live in colonies, and distinct species in the same forest without mutual annoyance, and in the same trees with parrots. They mimic man in every thing. The ourang-outang has no tail, and full grown are 5 or 6 feet high. Their arms are long, and they use them as legs and hands. They carry clubs for offence, move in herds, and reside in huts made of leaves. Two or three which have been brought to Europe were docile, sensible, imitative, and very affectionate. In Africa they perform much labour, and are very useful. The pigmy without a tail is but 2 feet high, but very ingenious, active, and mischievous. The mona monkey is a great favourite in India, and they are fed and encouraged in some places. At Amanadab, the Gentoos have three hospitals for them, and at Dhuboy they are more numerous than men, and must be fed, or do mischief.

It is the magot or Barbary ape which is usually made to perform feats in Europe. The sphinx-baboon is 3 or 4 feet high. In Borneo they pillage houses, and move in large and very mischievous troops. The ursine baboon resides in the high lands, near the Cape of Good Hope, and is very mischievous, and often dangerous to single travellers, carrying clubs and throwing stones with great dexterity. The preacher monkey or Beelzebub, fills the woods with noise, travelling on the tops of the trees, and one haranguing the rest, displaying in every thing perfect sagacity.

The lemur family, in 5 genera, are like the monkey, except in the head, which more resembles the fox, and they are less imitative, though in trees as active as monkeys.

When Mr. Forbes governed Dhuboy, there were 40,000 inhabitants within the houses, and 40,000 monkeys on their tops. He complied with the request of the Brahmins, that the British residents should neither shoot monkeys, nor any thing within the city, and it was soon filled with squirrels, peacocks, doves, parrots, &c. to the unspeakable satisfaction of the Hindoos.

An unfeeling Englishman having wantonly shot a female monkey 40 or 50 assailed him, and obliged him to retreat, but on giving up the dead body, they took it and retreated.

A *Lion-Bait*, by trained dogs, took place at Warwick, in July 1825. One lion killed two or three with his paws, but would not bite them. Another seized them with his teeth, and held them up with contempt, killing three or four.

Bears are of three species, totally distinct in their characters and habits. The black bear is a docile, harmless creature, living on roots and fruits, and mischievous only to bees.

The giraffe's head is about 18 feet high. This arises from the length of the neck and chest, for the legs are nearly of equal length, like those of other quadrupeds.

Camels are from 6 to 7 feet high to the top of the protuberance on the back,

and they weigh from 13 to 14 cwt. The Bactrian camel is the largest, and has two bunches on its back. The dromedary of the Arabians has but one, and is the most common. The bunch on the back is glandular, and not connected with the spine. They move both the feet on the same side, and therefore jolt their riders. They require little and coarse food, and live for 10 or 15 days without water. They kneel to take up their load, and carry from 500 to 1500 lbs. They have cavities in the stomach which retain water, or, as some suppose, a second stomach. Their average pace is two miles and a half an hour. The deserts could not be traversed without them. Dromedaries are swifter than Bactrian camels, and without a load go 6 or 8 miles an hour for 10 or 12 hours. Caravans consist of from 1 to 4000, and many Arabs possess 4 or 500. The Tartars employ them in waggons: they cast their hair every year, and it is made into cloths, stockings, shawls, carpets, &c. Their useful lives extend from 40 to 50 years.

The camel in the east is the most valuable servant of man. It eats little and drinks less; the milk makes cheese and butter; shoes and harness are made of his skin; and of his hair tents and clothing; while, for burthen, he is the ship of the desert.

Dromedaries have been tried in the West Indies, but without success.

It is computed that, in an ordinary way, a dromedary will perform a journey of 500 miles in four days.

Tents, carpets, and cloth are made of camel's hair in Arabia and Persia.

The horse is believed to be indigenous in Tartary, and there they have the finest breeds.

The mule is the produce of the *male* ass and mare, and the *hinny* of the she-ass and horse. The mule is larger, more like the mare, and the hinny more like the she-ass. Neither propagate with one another.

Mules are more hardy and longer-lived than horses, bear heavier burthens, and are more sure-footed.

English race-horses run at the rate of from 55 to 58 miles an hour, or a single mile in 62 or 63 seconds. Stage-coaches with their draft, often run 10 or 12 miles an hour. In a passion for swift travelling, George III. always went, on journies, 14 or 15 miles; and his son, the Duke of York, used to urge post-horses 16. A 4-wheel carriage has been drawn 20 miles an hour.

Bakewell's black draft-horse will draw above three tons.

A horse has 24 grinders, 4 tushes, or single teeth, and 12 front teeth. At five the colts' teeth are shed, and the tushes appear; at six they are grown, and at eight the black marks disappear, and the horse is then called aged.

Eclipse ran a four-mile heat in eight minutes carrying 12 stone, and requiring neither whip nor spur, beating with ease every horse against which he was ever matched. He died at twenty-five, in 1789.

Childers ran four miles in 6 minutes 48 seconds, or at the rate of 35½ miles an hour, carrying 9 stone 2 lbs.

An American horse, called Tom Thumb, in February 1829, trotted in harness in ten hours and seven minutes, 100 miles near Staines. The driver and vehicle weighed 248 lbs. He had gruel at every 20 miles, was 14 hands, and 12 years old. No whip was used, and it was difficult to the last to hold him in.

In a race near Petersburgh, of 71 versts or 47 English miles, between two English hunters, and two picked Cossack horses from the Don and Ural, the English beat the Cossacks decisively, performing in 168 minutes.

Arab horses do not lie down, but sleep standing and rocking.

Spanish asses are often 15 hands high.

Wild asses in Tartary and Thibet live in troops, and keep sentry; being very vigilant, and if attacked, swift in escape.

Two rein-deer drag a sledge 50 or 60 miles a day. The traveller is tied in it, and poises it as necessary.

Fallow deer fight in parties for their pasture, often for successive days.

The herds of lamas, and those of most animals, have sentinels to give warning of the approach of danger.

From 500 to 1000 stags were slain in some ancient hunting-matches.

Male deer only have horns, which, after their sixth year, they shed annually; they weigh from twenty to twenty-five pounds. The park deer are called fallow deer. The great red deer are less common. They have a leader, and, if necessary, fight in concert. The females expose themselves to save their young.

The horns shed by the Wapiti American Deer, in the Zoological Gardens, weigh 21 lbs. 5oz.

In 1710, bullocks weighed 370 lbs. calves 50 lbs. and sheep 28 lbs. In 1832, bullocks weigh 800 lbs. calves 140 lbs. and sheep 80 lbs. There are in Great Britain above five million head of cattle. Each of the inhabitants of London eats or wastes 107 lbs. of meat per annum, Paris 85 lbs. besides poultry, &c., Bruxellus 89 lbs.

The Chatsworth ox, four and a-half years old in 1831, weighed 220 stone of 14 lbs. or 3080 lbs.

Bullock s perform indifferently with yokes and bows: in France, they draw by the horns. They plough an acre per day with ease. Four bullocks draw three tons of coals; two draw 35 cwt. three miles; and two draw 1020 sheaves, weighing 6375 lbs.—*Young.*

Herds of 10,000 wild bisons are often seen on the Mississippi.

The horns of the Abyssinian ox are nearly four feet long, and seven inches diameter at their base.

The Abyssinian buffalo is double the size of our oxen; and two draw as much as four horses there, in Egypt, and Persia.

Bull-fights in Spain are equivalent to the fights of gladiators among the Romans, which at once disgraced and brutalized that people. The amphitheatre for this atrocious amusement, as it is called, is 330 feet in diameter, with an area of 225 feet, and sitting and standing room for fifteen thousand spectators. The assailants are called picadores, are on horseback, and provided with a long spear. The bull soon destroys the horse in the most horrid manner, and then other combatants on foot come in who carry cloaks to distract the bull till the picadore has procured a fresh horse, when the combat is renewed.

The sheep in the Shetland Islands are calculated at 150,000, and the finest of their wool is wrought into stockings at two guineas a pair; the coarsest very cheap.

Sheep, in wild pastures, practice self-defence, by an array in which rams stand foremost in concert, with ewes and lambs in the centre of a hollow square.

The goats from whose under-wool Cachmere shawls are made abound on the dreary table lands north of the Himalayas. The Tartars claim a monopoly of it. Some have been brought alive to England.

Dr. Gall relates an anecdote of a dog which being taken from Vienna to England, escaped to Dover, got on board a vessel, landed at Calais, and after accompanying a gentleman to Mentz, returned to Vienna.

Jesse relates that a poodle-dog, purchased in Paris and brought to London, on making his escape was soon after found with his old master, a shoe-black, in Paris.

Three Hudson's Bay dogs draw a sledge loaded with 300 lbs., 15 miles a day.

A commission to hunt wolves in the counties bordering on Wales was granted so late as 1281, and in Scotland 200 years later.

The wolves in Russia devour horses, foals, cattle, sheep, &c. In one government, Livonia, in 1823 they destroyed 3000 horses and foals, 2500 cattle and calves, and 16,000 sheep and lambs.

Wolves near Hudson's Bay hunt in large parties. They surround their prey, or form crescents and drive them over precipices. A party actually tried this on Dr. Richardson.

Wolves avoid passing under any thing, therefore shun woods, and seldom pass through hedges. When they cross a river, they follow one another directly in a line, the second holding the tail of the first in its mouth; the third that of the second, and so of the rest. This figure was chosen by the Greeks to denote the year, composed of twelve months following one another, which they denominated Lycabas, that is, the march of the wolves.—*Abbé Pluche.*

Beavers are among the most sagacious of animals, and being gregarious, they claim sympathy by their social habits from every man who is a MAN. With their small paws and tails they construct curious habitations, solid and strong. They choose a river, and form a dam across it with perfect foresight as to water way, strength, &c. contriving to drive strong stakes three feet into the bed of the river. They live chiefly on roots, of which they form magazines for the winter, and sufficient for their village of 18 or 20 tenements. European merchants seduce the savage Indians, for rum and tobacco, to hunt and slaughter these harmless creatures for hats, though there are better materials; and for the castor, articles of trifling value compared with the outrage on humanity.

The badger is a perfectly harmless animal, and the object of brutal attacks by the lowest of the people. They are about two feet long, and live under ground, feeding on roots, frogs, and worms, and perfectly inoffensive; yet, to bait a badger with dogs is a disgraceful sport of the vulgar in most parts of England.

The hare is a timid, but very sensible animal; it cries like a child when caught in a snare, and exclaims *rafe* with human distinctness when worried by ferocious dogs and hunters. It lives seven years, and is often tamed.

That harmless South American animal, the Armadillo, when in danger, rolls itself into a ball and very hard.

When a porcupine is irritated, he erects his quills, but does not dart or shoot them.

The Java squirrel flies from tree to tree, by a membrane stretched like a sail. They are 18 inches long.

Squirrels in bad seasons often migrate in northern climates in amazing troops, moving onwards in right lines like lemmings and rats.

Lemmings are the locusts of Norway, Lapland, &c. even to the Urals; and on islands as well as main land. They form a bridge head and tail, and those which follow pass over the backs of others. Nothing turns them or daunts them.

The lemming varies in size from the rat to the mouse, and is celebrated for its numbers, and their straight line of emigration in tens of thousands, never turning aside, and destroying as they advance, but encamping at times, and acting with method.

Mice are easily tamed and are very amusing, being fond of music, and very clean, elegant, and harmless. They shun the odour of elder.

Brown rats were unknown in England till 1730, but they now exceed native black rats in numbers. Their quantity drove the Dutch from the isle of France. They are often tamed, and have been taught to play tricks.

The Hamster rat is of the largest species, very bold, fierce, and destructive. They construct very curious dwellings and are dormant in winter, but store up provisions. They are without fear, and fight till overcome; and so numerous as to create scarcities of grain. The meadow mouse has similar habits, but it is timid, though destructive of corn crops.

Mice will live entirely without water; for though, says Dr. Priestley, I have kept them for three or four months, and have offered them water several times, they would never taste it; and yet they continued in perfect health.

Black rats are tamed in Germany, and a bell being put about their necks they drive away other rats. The economic rat of Siberia lays in a stock of winter provisions. The hamster does the same, and to assist him has pouches.

The dam of the northern foxes will follow those who kill her young for 60 or 70 miles, and howl round them by night and day, till she has in some way avenged herself.

The dog, the fox, wolf, and jackall intermingle their breeds. Jackalls hunt in packs with much noise, and hence drive prey into the haunts of lions, &c.

Marmots make spacious and convenient habitations of several chambers, some of them several feet in diameter.—Marmots cut, make, and carry hay for their nests.

The spines of the porcupine are from nine to fifteen inches, and perfect hard quills, which the animal can raise at pleasure, but not dart as pretended. They roam by night in quest of roots and vegetables, and are inoffensive, their spines protecting them from all attacks.

The sloth crawls on its belly, and does not advance above 100 yards in a day. It is two days in climbing and descending a tree.—The arm and forearm, taken together, are nearly twice as long as the leg and thigh; so that when the animal walks on all-fours, it is obliged to trail along on its elbows. The pelvis is so wide, and the cotyloid cavities turn backwards so much, that it cannot bring its knees together, but is obliged to keep the thighs wide apart.—The articulation of the hind-feet appears, as if intended to prevent the animal from having any power of using them. When the leg is vertical, the foot is in a direction nearly similar, standing on its edge, so that the animal cannot place the sole of its foot upon the ground, but by stretching out its leg, until that is placed in an almost horizontal direction. The toes of the animal are enclosed, quite to the nails, in a stiff skin, which will only allow of their being bent and straightened all together. To add to its difficulty of motion, several bones, which, in other animals, are distinct, are here joined, and make but one. It has nine vertebræ. Its teeth are ill connected, and not firm. Its nails are of an enormous length. It can scarcely crawl a yard in an hour, and cannot without difficulty ascend a tree of moderate height in a day.

The glutton is the size of the badger, and very fierce & voracious, eating from 6 to 13 lbs. of flesh per day. The raccoon, of the same genus, is well known in Jamaica, &c. where, in troops, it devours the maize and fruits, and displays great ingenuity in catching shell-fish.

The ichneumon, in Egypt, performs the office of the European cat as a destroyer of rats and reptiles, and devourer of eggs. It is like the cat, but legs shorter.

The weasel has similar propensities in northern climates.

The ferret is the length of a cat, with the habits of the weasel.

The martin is an enemy of cats.

The ermine, or stoat, and the sable are like weasels but longer, and their skins fetch high prices.

The pole-cat is larger than the male house-cat, and very destructive to poultry, pigeons, rabbits, &c.

The hedge-hog is an inoffensive animal, often barbarously treated by the vulgar; they live on roots and insects, in holes in banks, and roots of trees with a mossy bed.

Guinea-pigs, or cavies, are the most prolific of animals, but very harmless aod amusing, also very clean, feeding on herbs, fruits, &c.

Hares are universal animals, but of various sizes from 7 to 12 lbs. In the arctic circle they are white in winter. Their stratagems to escape danger are numerons and ingenious, but besides man, the enemy of every thing living, they are the prey of dogs, eats, weasels, eagles, &e. The Tartarian hare is not larger than a rat, and lives in deep burrows.

A case occurred in 1830 at Hulton Park, of one doe-hare suckling six leverets, from which on approach she would not fly.

Rabbits do not burrow in hot climates. They have centinels to give warning of danger, chiefly females, who enter the holes last.

The great ant-eater catches ants by stretching ont its tongue and lying still, and on the ants running on it he draws in his tongue. But it often breaks into ant-hills, and penetrates them with its tongue till satisfied. They have been tamed.

Mole-hills are curiously formed by an outer arch impervious to rain, and an internal platform with drains, and covered ways on which the pair and their young reside. They live on worms and roots, and bury themselves in any soil in a few minutes.

The Zorilla or Yagouare of Tucaman has the facolty of discharging such a volume of offensive phosphorescent excrement as to blind and burn its assailant, and render it impossible to wear the same clothes again.

There are in New Holland 40 species of the opossum and kangaroo family, wholly pecoliar to that enuntry.

The kangaroo is the size of a large sheep, carnivorous and graminivorous. Their fore-legs are short and have five fingers. The hind-legs are four feet, and they stand upright on them, and run and leap, or rather fly with them. They work their ears like a rabbit. The females, like other aoimals of Australasia, has a pouch for her yoong, and the odder and teats are inside it.

Another native animal is a quadruped with the bill of a duck, called the *ornithorincus paradoxus*. The birds are equally original. The swans are black, and the eagles are white, some of them seven feet high. Every thing has an original character. All the quadrupeds are like opossums, all the fish are like sharks, and the very land aod trees have peculiar featnres.

The full-grown kangaroo weighs 150 pounds, and from the nose to the rump is 4 or 5 feet long, with a tail 3 feet. It uses its short fore-feet as hands, like squirrels, and leaps on its hind-legs 14 or 16 feet at a bound, faster than a dog can run. The kangaroo displays a maternal feeling interesting to the moral sense. If the mother is wounded she assists her offspring in its escape; and on gaining a plaee of safety she caresses it to dissipate its alarm, and if mortally wounded by any black or white savage, her attention is entirely directed to the security of her young.

The pouch of the kangaroo and the opossum is a fold in integoments of the belly, with an external opening, where the young are received in a tender state, and nourished by the paps within the cover.

The wild boar is the pareut of the common hog, but smaller, less glottonous, and living chiefly on vegetables. They are only dangerous when attacked, and then the means of defence are tusks ten inches long.

One pair of pigs will increase in six years to 119,160, taking the increase as fourteen times per anuom. A pair of sheep in the same tioie would be but 64.—*Allnut.*

The bones of Birds are larger and more hollow than those of quadrupeds. They respire through other cavities than the lungs, and to regolate their flight can blow oot their bodies. The spine is fixed, but the neck has from 9 to 24 bones. The bones of the wings and legs resemble the fore and hind-legs of quadrupeds, but those of the wings terminate with three joints or fingers.

The song of birds is a movement in sneeession, equal to a bar of 4 adagio erotchets, performed in 4 seconds. Of singing-birds, the nightingale onites the highest perfection of qualities, the linnet next, then the tit-lark, the sky-lark, and the wood-lark; the gold-finch and the robin excel in lively notes.

Birds have two larynxes at each extremity of the wind-pipe. That next the lungs is the organ of singing. In some there are windings in the wind pipe. Frogs have in the larynx membranoos bags. In July most singing-birds become silent. Those which sing through the winter are chiefly young birds.

Mr. Gardner shows in his notation of the music of birds and animals that most original ideas of the first composers are derived from those natoral expressions.

Birds which nestle in holes, as wood-peckers, wry-necks, robins, swallows, &c. have eggs of a shining white. Pale green or pale blne characterizes the eggs of the stariing, fly-catchers, hedge-sparrows, &c. A green colour

in those who lay loosely among grass. The nuthatch titmouse and chimney-swallow are party-coloured with a white ground. Others, not white, are larks and singing-birds.

Fish and birds can see through the nictitating membrane, which they draw over their eyes to screen them from the sun.

All hair is hollow and cylindrical. Young birds are covered with it, and feathers are a variety produced from a bulbous root in the skin.

The birds which pass but part of the year in Britain, are the cuckoo, grouse, wry-neck, stare, hoopoe, thrushes, ring-dove, chatterer, turtle-dove, grosbeaks, buntings, finches, larks, fly-catchers, wagtails, warblers, nightingales, black-caps, willow-wrens, white-ears, white-throats, goat-suckers, herons, curlews, snipes, rails, wild-ducks, and other water-fowls.

Swallows stay in England from 22 to 26 weeks. Other birds from the arctic circle pass their winter with us, and breed there, as the auk, the woodcock, snow-bunting, &c. which pass to Lapland, Greenland, &c. Some migrate by night and others by day, and the males go before the females, as is well known to bird-catchers. Some of them are supposed to travel at the rate of 120 miles an hour, and most of them start when the wind is fair. At this rate, swallows, &c. would reach the African coast in a day, and the German ocean would be crossed in a morning.

The cuckoo begins to sing, and swallows appear in different parts of Great Britain between the 20th of April and the 10th of May.

Five species of birds of passage enter Spain annually from Africa, and are seen to pass and repass in flocks at certain changes of the season.

I have found by experience, that migrating birds go in a direct line from north to south, and never take their course from east to west, or west to east.—*Hasselquist.*

In the arrivals of migrating birds, the males arrive several days before the females.

Birds of passage which pass to very distant climes and regions return to the same localities, and often occupy the same nests, though absent for many months. The swift departs before the 1st of September, chimney and house-swallows early in October, and the sand-martin about the middle: the cuckoo in spring precedes the arrival of the sand-martin. The crake, the quail, and the goat-sucker pass the summer in our latitude, but the red-wing, the field-fare, the woodcock, the snow-bunting, the silk-tail, the hoopoe, pass the winter with us. It is believed that the swallows, &c. which visit Europe in the summer, pass the winter in Africa, and the birds which pass the winter in this climate, pass the summer in Lapland, Norway, and Iceland.—Their migration can, of course, only be the result of intelligence and habit, in which the older birds direct the young ones from generation to generation. Their flights to and fro are often witnessed in the Mediterranean, but the greatest curiosity of their economy is that of returning to the same localities. Some writers pretend that swallows do not migrate because they find a few at the bottom of ponds, which have been drowned in skimming them to catch flies.

Carrier pigeons are a larger species than the common pigeon. They have a wattle extending over half the bill, and hanging down on both sides as a piece of white flesh, and this is supposed to be connected with the properties as a carrier. The eyes are also surrounded by a similar substance, and importance is attached to its width. Noah seems to have employed one, and they were used by the ancients during sieges. The Turks and all eastern nations employ them, and in Turkey there are stations from which they pass, and fresh birds are forwarded. The Turks train them to different distances progressively, and their flight is only certain while they have eggs or unfledged young. They rise very high before they start, and travel from 25 to 40 miles an hour. Besides this singular return of pigeons, the swallow and the crow, and cats and dogs, have the same occult faculty.

By a careful experiment in July, 1830, it appeared that pigeons passed from London to Antwerp, about 210 miles, in 5½ hours, *i. e.* at 38 miles per hour.

The migratory and resident birds of North America are 320 species, and the singing-birds are superior in melody to those of Europe.

Mr. Audubon describes the wonderful flocks of pigeons which range over North America. He saw 163 in 21 minutes, all passing in one direction, at the rate of a mile per minute, and he estimated each flock as containing a billion of pigeons, and in this way they were passing for three days.

The black ostrich stands 7 feet high. Their speed is that of the horse, and they can carry a man. The cassowary is as large, but has a shorter neck. Both of them are African, and they feed on vegetables.

In Norway, eagles destroy oxen by the following contrivance; they dive

into the sea and then roll themselves in the sand, and afterwards, by flapping their wings and shaking their feathers into the eyes of an ox, they blind it and overcome it.

The American pelicans carry food to any other who is ill or disabled. And the pelican carbo or cormorant is used on the Chinese coast for fishing, and formerly was so used in England. Gannets abound in the western islands, and 20,000 are taken annually at St. Kilda.

There are 32 species of the falco genus, including most birds of prey, as eagles, kites, hawks, falcons, &c. They are very active, keen-sighted, strong, and long-lived. They subsist on young animals, fish, seals, and other birds. It is a libel on human nature to state that these savage birds used formerly to be tamed and used for the genteel pastime of falconry.

There are 4 species of swallows, or hyrundo genus: the chimney swallow (*rustica*,) the house martin (*urbica*,) the sand martin (*riparia*) and the swift (*apus*,) and they arrive in spring in this order.

The bird of Paradise is a native of North Guinea, near the Equator. They migrate to Aroo in flights, but will not live in the cruelty of confinement.

There are 50 species of owls, a bird of night, and very solemn in its appearance, having a ruff which resembles the full wigs now worn only by judges.

The *pip*, a disease of poultry, is a thin film which grows under the tip of the tongue.

There are 50 species of wood-peckers. The largest native of England is the green, 13 inches long, an enemy of ant-hills.

Sparrows generally have three broods in a year.

The magpie, the wren, and the long-tailed titmouse, among British birds, build domed nests.

The voluntary act of emptying the stomach is possessed by some birds, as the pigeon, who has an organ for secreting milk in its stomach, as Mr. Hunter observed: and it softens the food for its young by previously swallowing it; and afterwards putting its bill in o theirs, returns it into their mouths. The pelicans use a throat-bag, for the purpose of bringing the fish which they catch in the sea to the shore, and then eject them and eat them at their leisure. I am well informed of a bitch, who, having pupples in a stable at a distance from the house, swallowed the flesh meat which was given her, in large pieces, and going immediately to her whelps, brought it up out of her stomach, and laid it down before them.—*Darwin.*

When seamen are thrown upon any of the unknown coasts of America, they never venture upon the fruit of any tree, how tempting soever it may appear, unless they observe that it is marked with the pecking of birds, but fall on without any fear where they have been before them.

Small birds baffle hawks by flying round and above them in great numbers.

Quills are for the most part plucked with great cruelty from living geese, and all persons from convenience, economy, and feeling, ought to prefer metallic pens.

Chickens are hatched by the heat of ovens by the natives of Berme, a village in Egypt. They hire themselves over Egypt for the purpose, and undertake to deliver ⅔ds as many chickens as eggs. The ovens contain from 40 to 80,000 eggs, and there are 400 of them in different parts. Each brood occupies 21 days, and they work their ovens for 6 months, producing altogether 100 millions of chickens in six months.

Wild ducks are estimated to fly 90 miles an hour, swallows fly rather faster, and the swift is said to fly above 200 miles in an hour.

Humming-birds are peculiar to America. The grouse to Britain.

The grosbeak creates a social nest in a canopy like a parachute, and builds some hundred nests in the rim or eaves. 320 nests, for at least 640 of these interesting birds, were found in a tree. The roof is a close thatching with grass.

Rooks live in sagacious polity. They consider for days before they build; and those established resist all encroachments of new settlers.

One Temple describes a Peruvian condor, whose spread wings were 40 feet, feathers 20 feet, and quills 8 inches round.

Male emus collect the eggs dropt by the female, sit, and hatch them.

On the Malabar coast, a flight of parrots is as destructive to the crops as locusts.

Petrils are called by sailors Mother Carey's Chickens, and are absurdly considered as portentous of disaster.

Flinders saw a stream of sooty petrils in Van Dieman's Land, 88 yards deep, 300 broad, and 1½ hour long, as swift as a pigeon, which stream, allowing nine cubic yards for each bird, must have contained 151 millions of them.

The practice is still continued in France, of nailing live turkies before a fire to enlarge their gizzards, and in

that country generally, the most frightful enormities are practised on helpless animals, to gratify slight differences of flavour, to monsters called *gourmonds.*

FISHES are, by Linnæus, divided into five orders: Abdominales, Apodes, Cartalagiuii, Ingulares, Tiinracaci.

Air is as necessary to fishes as to animals, and they respire in sleep twenty-five times in a minnte. The air is extracted from the water by an apparatus called *branchial*, small, but extensive when spread out. They die in water deprived of its air, under ice, or on having their gills tied up.

The air-bladder of fish enables them to rise or sink at pleasure; and this power, and that of the fins and tail, gives the largest a speed many times greater than that of any ship.

The brain of fish is small, and does not fill the skull. They have no tympanum, and no external ear. They have neither windpipe nor larynx, but breathe by gills. Their nose is not connected with respiration, and they have no urinary bladder.

In the ovula of carp-fish, called the roe, nearly 150,000 germs of eggs have been counted, and in that of a sturgeon, weighing 160 pounds, nearly 1,500,000.

There are 2500 known species of fishes.

The gills of fishes are composed of four plates on each side, and communicating with the throat by a single opening for each gill. They receive the water by these holes, and discharge it by a different opening, after appropriating the air. The gills too have a moveable cover. The gills of the cancer are near the legs.

Many fish are very long-lived. Carp and pike have been identified for above 200 years. Their respiration is repeated every two or three seconds, and their gills are larger than the surface of their bodies; in this respect resembling the expanded lungs of animals.

The art of sailing is merely an imitation of the nautilus. There are thirty species; some so large that drinking-cups are made of their shells. The fish is independent of the shell. In sailing it stretches out two of its arms, which hold up a membrane as a sail; and with two other arms and its tail, rows and steers. The prodigious number and size of those in a fossil state proves that they were at one period more important than they have been since. Man has exerted his power as the universal destroyer.

The monoculus, or crab genns, has fifty species, distinguished into seven sections, as they have one or two eyes or one or more shells.

All flat fish are comprised in the genus *pleuro nutes:* species of which are the flounder, hollibut, plaise, sole, turbot, dab, &c. They have their eyes on the right side.

The cod-fish, or gadus, which supplies the Catholics with such luxurious repasts on their *fast* days and in Lent, abounds, in shoals, on the coasts and banks of Newfoundland, Cape Breton, and Nova Scotia. They are from 14 to 40 lbs. and larger.

Mackarel, &c. pass the winter in the mud or sand in deep water, and emerge in the spring.

A fish in Java, called the jaculator, catches flies and insects, by squirting from its month some water, and seldom misses its aim at the distance of five or six feet, bringing down a fly with a single drop.—*Mitchel.*

Herrings breed in the Arctic Ocean, and in April and May pass in immense shoals through the British Seas, followed by fishes and birds of prey. The Dogger Bank in the North Sea, 190 miles long, is the favourite resort of these and of turbot, cod, soles, &c. Other banks in the same sea, from Holland to the Shetland Islands, are also resorts of these fish.

In the Bahamas, the violet crab lives in the mountains, but spawns in the sea, and travels there for the purpose; after which the young crabs travel to the mountains.

At Coppermine River, fish were so frozen as to break with the blow of a hatchet; but if others were thawed before the fire they revived.

Gold and silver fish, or gold carp, were first brought from China about 1728, where they are only the size of an anchovy.

That *lusus naturæ*, the flying-fish, has very large pectoral fins. When pursued by the dorados and other fish of prey, it rises into the air on these fins, and flies as long as they continue wet, 10 or 15 yards.

To enable them to grow, lobsters shed their shells every year. It softens, and they disengage themselves from it, retire into a hole, and in a few days a fresh shell secretes and hardens. Such is Nature's care of an animal which man so packs and tortures, and proves his monstrous cruelty by boiling, and often roasting alive, while the piercing cries and shrieks of the wretched animal excite only ignorant contempt or boisterous sport.

The medusa has long blue filaments, which are so poisonous that no fish of prey dare approach them.

The dugong is a grazing sea animal, which, at the bottom of the sea, feeds on marine plants. It is as large as a cow,

and is often seen in shallow water between the tropics.

Sharks are often so large as to weigh 3 or 4000 lbs.; living partly on vegetables, but voracious of every thing, and the terror of tropical seas.

The delphinus, or dolphin genus of fishes, consists of the dolphin, porpoise, grampus, and leucas, or white fish.

The cod, according to Leuenhoeck, annually spawns nine millions of eggs; the flounder a million, the mackarel half a million, the herring 10,000, the carp a quarter of a million, the perch more, and the sturgeon six or seven millions. Of the viviparous, the blenny brings forth two or three hundred. The spawn of one genus is mostly devoured by others, and not one egg in a hundred is supposed to be hatched.

Young eels migrate in May, when about two inches long, in a line often extending for miles, apparently for room and change of water.

The sea-elephant, called *proboscidea*, the victim of commercial cupidity in the South Seas, is 20 or 30 feet long and 15 or 18 in circumference.

The marine animals of the Euxine are identical with those of the Caspian.

Aristotle divided SHELLS into three orders; univalves, of one piece, and bivalves, and turbinated; and the same arrangement is still preserved, except that the order is changed by Linnæus, and the turbinated are called multivalves; and he divides them into three genera of multivalves, fourteen of bivalves, and nineteen of univalves. Latreille has since published another arrangement in 153 genera, but not more satisfactory. The best work on British shells is by Donovan. In univalves, in some species, the cavity is divided into chambers, with a pipe of communication; the base is the mouth and opposite is the apex. The convolutions are called whorls. The hinge in bivalves is sometimes furnished with teeth. It is usually joined by a strong ligament. They adhere to rocks by a thread-like substance, called the beard. The forming of collections of these natural trifles is accompanied by the cruel practice of plunging the shell in boiling water, to kill the animal; and, in some cases, this has not succeeded, for shells put away as dry have sometimes been found crawling, and after a considerable lapse of time.

Nautili, volutæ, and cypræa, are only perfect in warm climates, and chiefly confined to them. The haliotis gigantea is found at Van Dieman's Land.

Four shell-fish, packed in cotton, and brought from Valparaiso, were, after from 13 to 20 months, revived in full health.—*Loddige.*

There are forty species of animal anemones or actiniæ. They are beautiful in structure, and wonderful in their economy. They are of a cylindrical figure, or pear or funnel shaped, but often like a marigold or rose. They are found firmly fixed on the rocks washed by the sea. They swell or contract at pleasure. They devour fish, crabs, &c. as well as flesh. They spread their numerous arms, or tentacula, and if one seizes any prey, the rest unite in securing it, and carrying it to the mouth. They are hermaphrodite, and cast their young from their mouth; and they often divide and become two animals; and so if cut into several parts, which, if torn away, the very shreds become perfect actiniæ. They cannot live in fresh water. They have sensitive feelings, shrink in case of danger, and enjoy the light, but no eyes have been traced. They can detach themselves to float in the sea.

Sponges are believed to consist of excitable flesh, full of small mouths, by which they absorb and eject water.

The shell of a sea cockle is the circulating medium of Angola and the neighbouring kingdoms. The cockles are caught on the shores of the island Loanda, held by the Portuguese, who thereby make the people tributary.

Snails, shut in a box with air, close themselves in their shells, and live in a dormant state for months or years, and revive in water at 72°.

The snail called *helix formatio* is eaten at Rome by the people during Lent, being fattened purposely. When snails attack fruit, they touch no other till that is gone: hence gardeners never remove them. Their eyes are at the end of each horn. Lice are found on their bodies, and worms in their intestines.

A shower of crabs fell with heavy rain, in the summer of 1829, in the yard of the poor-house at Riegate, and were lively, weighing two ounces.

The bony scale on the back of cuttle-fish is used for tooth-powder and pounce. This fish squirts a black fluid like ink.

The Persian pearl-fishery is carried on at the Bahrin Islands, in the Persian Gulf. The vessels amount to many hundreds, and the pearls weigh from ten to fifty grains.

Oysters differ from muscles in being attached where they grow. They spawn in May, like drops of candle-grease in water, which attach and grow for three years. On the coast of Coromandel they are two feet in diameter.

The liquor of the oyster contains innumerable embrios, with transparent shells—120 to the inch; and also other animalculæ, as three kinds of worms,

&c. They turn over with the tide. The sea-star, men, cockles, and muscles are their enemies.

Swammerdam printed his great work on INSECTS in 1669. He divided insects into four classes, as spiders, &c. which include the modern classes crustacea, myriapoda, arachnoida, and acari. His second class consisted of those who appear perfect on leaving the egg, and have no wings till they shed their skin, and it includes the orthoptera, dermaptera, dicteroptera, hemiptera, and some of the neuroptera. In his third class he includes those hatched, as caterpillars, which change into a chrysalis, and remain so till perfect; it includes the coleoptera and aptera. His fourth class includes those who, on attaining their pupa state, retain their skin, as the hymenoptera and diptera.

Ray's work on insects was published in 1712. He adopted two divisions, those which undergo no change, and those which pass through the state of larva.

Valasnieri, in 1730, distributed insects into four groupes. 1. Those who live on plants. 2. Those who live in water. 3. Those who live among stones. And 4. Those who subsist on animal remains.

There are 1000 species of the genus *Musca*, fly.

Great Britain has from 8000 to 10,000 species of insects and arachnoidæ, of which 2000 are caterpillars.

Countries have their insects. Those of China, &c. differ from those of Europe and Africa. Those on the east and west side of the Andes are quite different.

Insects lay from two eggs to many millions of eggs per annum, so with fishes, and so with the seeds of vegetables. The attempted evolutions are superabundant, but the maturity is circumscribed by destruction, waste, &c.

Dr. Dwight publishes a case of an egg producing an insect 80 years after it must have been laid. He thinks the power of vivification may endure an indefinite period, and mentions that mustard-seed buried 200 years, grew and flourished. He ascribes to this the periodical intervals of insects.

The wings of insects afford an immense variety of interesting and beautiful objects. Some are covered with scales, as in the butterfly tribe. Some are adorned with fringes of feathers, and the ribs or veins are also feathered, as in many of the gnat family, and even these scales and feathers are ribbed and fluted in a variety of ways. The earwig is not generally known to have wings, from their being folded up on the back into so small a compass. In size, wings differ as much as in every other particular, some are so minute as to be scarcely perceptible, and others are several inches in length. The elytra, or wing-cases, of many insects are beautifully transparent objects, such as those of the boat-fly, the grass-hopper tribe, and many of the minute cicadæ, or frog-hoppers, &c.

The greater part of the head of most flies is taken up by two protuberances, which on a minute examination with a common magnifier seem to be reticulated, or similar to net-work. These are the animal's eyes, and consist of an immense number of convex lenses. In the l.bellula, or dragon-fly, there have been counted upwards of 25,000 of a hexagonal figure and a brilliant polish. The eyes of crabs and lobsters, and all that family, consist of lenses of a square form.

Few insects live more than a year in their perfect state, but often much longer in their larva state. Their first state is the egg, then the caterpillar, then the chrysalis, or pupa, and finally the perfect and procreative form. But in these changes there are infinite degrees and varieties of transition, all which constitutes the pleasing and very instructive study of entomology.

Insects appear as eggs hatched in a caterpillar or larva, which changes into a motionless chrysalis or nympha, the covering of which bursting, a butterfly evolves with wings, long-jointed legs, and two antennæ. Some have jaws, others no jaws; some have no wings, and others have four wings variously marked, and one order but two wings.

Insects have lymph instead of blood, and no bones, but hard coverings to which the muscles are attached. They have no vertebra. They do not breathe through the mouth or nostrils, but have air-vessels along their sides, called *spiracula*, and connected with other vessels called *bronchiæ*. They have the organs of sense, and make all the discriminations which accord with their physical powers and wants. They are oviparous, but scorpions and aphides are viviparous. All the winged insects exist as larvæ, and undergo metamorphoses previous to their perfect or propagating state. The male is always smaller and more coloured than the female, who alone have stings, but males have horns.

Insects breathe through holes or pores on each side of every segment of the abdomen, called *spiracula*.

The antennæ are important organs of insects, equal to the hands of man. By them the bee works in constant darkness.

There are 292 species of the bee or apis genus, and 111 in England: among solitary bees the following deserve notice:

The *rose-cutter* separates circular pieces from leaves with precision, and digging a hole 6 or 8 inches deep in the ground, the bee rolls up the leaf and depositing it in the hole, lodges and secures an egg in it with food for larvæ when hatched, and often several, but all separated, and very perfect; and the bee then resides in the upper part to protect her brood.

The *upholsterer* makes a hole enlarged at the bottom, and lines the whole with red poppy leaves, lays her eggs, supplies them with food, &c. separately, then turns down the lining to cover them, and closing the hole leaves them to mature.

The *wood-piercer* makes a perpendicular hole with vast labour in a decaying tree in the sun-shine, a foot deep. Then deposits her eggs and food, and separates each by a dwarf wall made of saw-dust and gluten, each higher than the other, and the last closing the hole; and she then makes another hole horizontally, to enable them to escape as they successively mature.

The *mason bee* constructs a nest on the side of a sunny wall—makes up sand pellets with gluten, and by persevering industry fixes and finishes a cell in which it lays an egg and provisions. It then forms others beside it, and covers in the whole, the structure being as firm as the stone.

Wasps and *humble-bees* make cavities in banks. They line them with wax, and make innumerable cells for their eggs in perfect communities, working together and forming lines by the removal of whatever incommodes them.

The *honey-bee* is well known and deservedly respected for the use which man makes of their industry, and too often by the wholesale *murder* of the ingenious creatures whom he robs. But this most cruel practice is now even from selfish motives abated. The queen is the mother of the whole hive, and her eggs become males, females, and workers or neuters which last make the combs and cells, and collect the honey. The Queen produces some thousands of workers, and then males, which the workers kill at the end of the summer. The workers attend the queen with anxious respect. If she die, they raise a new one by various arts from a working worm. Two queens cannot live in the same hive, and one is destroyed.

They have four wings and six legs. The body is covered with hair, and each hair is like a plant in miniature. The proboscis is employed in collecting honey by licking it from the flower and conveying it to the stomach, whence it is disgorged into the cells. The wax is formed from the honey. The females and workers have a sting, but the males or drones none. It is double and provided with barbs, which the animal depresses and draws out the sting unless suddenly driven away. The sting emits a poison into the wound.

In proportionate size the queen bee is 8½, the male 7, and the workers 6. A queen will lay 200 eggs daily for 50 or 60 days, and the eggs are hatched in 3 days. The workers are 5 days in the worm state, and in 20 days they become bees. The males are 6 or 7 days in the worm state, and 24 days in becoming perfect bees. A queen is 5 days in the worm state, and in 16 days is perfect. When eggs are converted into queens, the old queen destroys them, or if there are two young queens they fight till one has killed the other. One author asserts that a single queen has produced 100,000 bees in a season. Every thing depends on the workers; they collect the honey, make wax, and build the combs, they supply the worms with food, and protect the entrance of the hive; separate business being performed by classes.

There are about 9000 cells in a comb of a foot square; their first purpose is as nurseries for the young, and they are then cleaned and filled with honey. 5000 bees weigh a pound. 20 or 30 pounds of honey are generally got from a hive, sometimes 80 or 100 lbs., and even more. Formerly it was an inhuman practice to suffocate and destroy the bees, thereby uniting murder with robbery, but good managers have for many years preserved them and fed them during the winter, by which plan five hives, at 1*l.* each, have in 10 years yielded a profit of 1280*l.* To destroy the swarm for the sake of the honey, is like cutting down fruit-trees for the sake of the fruit.

When bees leave a hive, all the individuals first reconnoitre the new situation in small parties.

A swarm of bees contains from 10,000 to 20,000 in a natural state, and from 30 to 40,000 in a hive.

All the experiments on bees prove, that love for their queen and her progeny is the sole stimulus to their persevering industry. Their joy, grief,

in mole-hills or among the roots of trees. There are eighteen species, and they are remarkably intelligent, ingenious, and industrious. Nests often fight like men, and kill vast numbers of each other.

An ant's nest consists of males and of females, who have wings; and also of neuters. The females enjoy the same pre-eminence as among bees; but the manners of ants are more varied, and system, object, and end, mark all their varied reasonings and labours. They have long and tenacious memories, know each other, and distinguish any stranger. They carry on systematic wars, and practice all the arts of attack and defence. Man himself is not more savage in war: but they are citizen soldiers, and not hired and trained for butchery and murder. They also practice slavery, making slaves of those they nvercome. They keep aphides, as men keep cows, for the juices which they yield. Their nests are formed at pleasure, and their cells of various forms. In Brazil they are almost masters of the country, and in Africa not less formidable. The termites, white ants, or cutters, not only destroy furniture, clothes, &c. but raise conical buildings, nine or ten feet high like villages, which it is inconvenient to approach.

M. Hanhert saw a regular engagement between two species of ants, in which they drew up in lines of battle, with reserves, &c. &c. and fought for four hours, taking prisoners, and removing the wounded, till victory decided for one party.

Gardiner, Kirby, and Spence assert that the motions of a flea on a nightcap have been discerned like the clack of pattens.

Kirby and Spence assert that the chirp of the cricket is produced by rubbing the legs together.

Lyonnet, in his work on the *Phalena Cossus*, or willow caterpillar, states that the number of its muscles are 4041.

A modern traveller asserts that the stories about the Tarantula are vulgar notions.

Canadian timber has introduced many new insects. So with some East and West India produce.

In five generations, one aphis may produce about 5000 millions, and there are 20 generations in a year.

Fleas are so numerous on the north-west coast of America, as to master, and often oblige the Indians to change their residence.

Every lb. of cochineal contains 70,000 insects *boiled to death*, and from 6 to 700 thousand lbs. are annually brought to Europe, for the fancy of scarlet and crimson dyes.

Spiders have four paps for spinning their threads, each pap having 1000 holes; and the fine web is itself the union of 4000 threads. No spider spins more than four webs, and when the fourth has been destroyed, they seize on the webs of others.

There are 6 or 7 generations of gnats in a summer, and each lays 250 eggs.

Bees, beetles, dragon flies, gnats, spiders, &c. have been observed to have minute *acari* or mites on their bodies.

The gall-fly forms the gall-nuts on trees and plants by its eggs and young, and the gad-fly does the same in the skins of cattle.

The aranea avicularia is a spider, large enough to catch and kill small birds.

The water-beetle, which lives on the spawn of fish, is said to convey it from one pond to another.

Cock-chafers, so cruelly abused by untaught children, are such pets of nature, that they are six years in the grub state advancing to maturity.

Amphibia are cold-blooded, and their lungs and heart are differently formed from warm-blooded animals. Their lungs are like bladders or membranes, and the heart has only one ventricle, with a vein to convey it in and an artery to carry it out. Their limbs and tail destroyed, grow again. They are torpid in winter, freeze with and in water, and revive when it melts. Frogs do not procreate till four years old, and tortoises live from one to two hundred years. Toads revive after being buried in rocks for countless centuries. Only a sixth of known serpents are poisonous.

AMPHIBIA are divided into two orders, *Reptiles* and *Serpentes*; and there are four genera of reptiles, testudo, draco, lacerta, and rana; and nine of serpents, crotalus, boa, coluber, angeris, amphisbœna, cæcelia, achrocordus, hydrus, and langaya.

Some amphibia have branchæ like fishes, and lungs like land animals. The larvæ of frogs and some other species are thus formed.

☞ Eleven genera of serpents have no poison fangs and 19 have, but compared with the others, these are very few in number. The chief of them are the rattle-snake, the crotalus of Carolina, one genus in Madagascar, another in Martinique, the naja of India and South America, the black adder of Sweden, and the viper or adder found in England.

Good intelligence should distinguish between the perfectly harmless *snake*

of England, and the venomous adder. The snake is oviparous, from two to five feet in length, of a greenish brown, with mottled longitudinal stripes, and ringed belly, of dull yellow and blue. The venomous *adder*, or *viper*, is viviparous, from two to three feet, with diamond spots in a bold pattern, and the belly dirty yellow. Its young, for protection, run down the throat of the parent. The slow-worm, or blind-worm, eleven or twelve inches, is harmless and viviparous.

The progressive motion of serpents is effected by raising the body into arches, and fixing their hinder scales into the ground, and in this way they move backward and backward, the ribs concurring with an active motion.

The great viper was accidentally carried a few years ago in a ship to Martinique, and is now most mischievous.

The whip-snake darts on animals from trees apparently like man, for mere mischief.

Serpents mostly swallow their food entire. The heart possesses two auricles and one ventricle, and they all breathe.

Hogs and goats kill and devour them.

They live on land or in water either salt or fresh.

The boa constrictor is from 20 to 36 feet long, and capable of swallowing deer, calves, or men whole, first crushing the bones by the strength of its folds. It usually catches its prey by hanging from the branch of a tree near the places where animals go for water, and its destructive powers are as above, for it has no poison fangs.

The coluber is from 30 to 40 feet.

The rattle-snake is from 5 to 8 feet long, but does not attack, and gives warning by the noise of rattling its tail.

In 1813, a boa constrictor was killed in the Isle of France, 14 feet 6 inches long: in his stomach were found several animals, as monkies, &c. half-digested.

Pliny and others relate that Attilius, a Roman general, killed a serpent 120 feet long, near Utica.

A sea-snake was cast ashore in Orkney, which was fifty-five feet long, and the circumference equal to the girth of an Orkney pony.

The liquid poison of vipers and other animals is of a yellow colour. It is secreted in two small vessels, and communicates by a tube with the crooked fangs of the viper. It has no taste, but applied to the tongue produces numbness. A brownish yellow substance, like gum arabic, remains after evaporation. Taken into the stomach, it kills small animals immediately. The poison of the bee is similar in appearance. It does not yield to the ordinary tests of analysis.

There are ten species of scorpions, mostly venomous, and some large.

There are 81 species of *lacerta* or lizard, of which the crocodile, the alligator, and guana are the chief. Those in England are very inoffensive timid creatures, and one species is the water-newt, three or four inches long.

Twelve species of crocodiles have been distinguished, four of which are called alligators, and two gavials. Those of the Nile are the largest, but they are now very uncommon; at least in Lower Egypt, where a crocodile would be regarded as a great curiosity. Their form is that of a lizard, sometimes thirty feet long, and nine or ten feet round. The body is covered with scales, hard enough to turn a musket-ball; with a mouth several feet long, filled with teeth like a saw. They pursue their prey with agility, but cannot turn, and therefore are easily escaped; but whatever is once caught is held fast, and if large, drowned. They roar like a bull, and in winter are said to be torpid. The females lay from thirty to one hundred eggs in a season, but they are destroyed by the ichneumon; and some species of the tortoise destroy their young. They are so tenacious of life, that it is very difficult to kill them. If well fed, they become tame; and Labat, an African traveller, asserts that they are seen in villages without dread, and even played with by children; their usual ferocity being ascribed solely to hunger. The excrements are vomited up, and the crocodile is obliged to come on shore as often as he has occasion to ease himself.

There are 36 species of the *rana* or frog genus, including toads, the whole being innoxious, while the common toad is curious from its longevity when enclosed in hollows of trees and stones, and the Surinam toad from its producing its young from cells in its back. The American bull-frog, 18 inches long, is so called from the frightful noise it makes in the woods.

The *testudo* or tortoise is so long-lived that two are recorded in England who lived 120 and 200 years. They know their friends, and display much intelligence. The turtle of this genus is very large, and subject to great cruelties to satisfy the whim of epicures.

In the library of Lambeth Palace is the shell of a tortoise brought there in 1623. It lived till 1730, and was then

accidentally killed. Another in the Palace at Fulham, procured by Bishop Laud in 1628, died in 1753. One at Peterborough was known to have lived 220 years.

A toad was found at Organ in France in a well, which had been covered up for 150 years. It was torpid, but revived on being exposed; nay, well-authenticated cases are recorded of toads found alive in old stones, and in old trees, where they must have lived for many centuries.

Jersey is so prolific in toads, that the people are called *Crapauds*.

Tadpoles live on the flesh of a dead fish, so as to leave a perfect skeleton in two or three days.

Earthworms are said to restore themselves after being cut with a spade. A snail's head and horns grow again in six months. An eye of a water-newt is replaced in ten months.

White ascribes the poverty of oft-flooded lands to the destruction of the earth-worms, which he considers a link in the chain of fructification.

A Manilla reptile changes its colours as distinctly as the camelion, pea-green to carnelite, bluish green, brown streak, &c. by the flexure and variation of its skin.

There are two classes of ANIMALCULÆ, seventeen genera, and 378 species. The first class, of ten genera, consists of worms in various forms. The second are worm-like, with additions; and most of them are visible only with the microscope.

They are produced by mixture of various substances in fluids; and by some supposed to be spontaneous, while others have referred their origin to various causes.

Many animalculæ have the power of resurrection, and after being dry grains for years, revive again on being put in a drop of water, and this may be repeated 10 or 12 times, if they are kept in sand, however dry.

Hempseed, rice, lentils, peas, pepper, beet-root, blighted corn, &c. all yield various kinds on being macerated in water; and however much boiled, the smaller kinds appear. Vinegar, too, produces eels, and all animal substances in putrescence display them. There are none in fresh rain-water, or pure spring-water. Sea-water, when used for the solution, produces them in swarms.

If paste made with flour and water is suffered to go sour, without becoming mouldy, the surface will soon be found covered with an infinite number of minute living beings, which, from their general similarity to that animal, have been called eels. The same animals, or as some authors think, a different species, is found in bad vinegar, and other mild acids. These animals are viviparous, and their increase is astonishing, but a hundred or more have been seen to issue from one single eel.

Lewenhoeck saw hundreds of animalculæ in the space of a grain of sand, and he says ten thousand, but it is now suspected that he saw the ultimate motions of the atoms of gas, and not organised beings. A drop of water contains hundreds, all in extreme activity, swimming or crawling with freedom and purpose. They appear to subsist on the atoms of the infusion, and some prey on others. Some have the form of flying-dragons with all their parts, others are like polype, some like worms, others with many legs like insects, while others have machinery of wheels which turn, create vortexes and apparently enable them to collect food. Some are like plants, with branches, each terminated with an animalculæ, and the trunk and branches alternately draw in and spread. Others are like hydatids, and evolve their generations in the skin. And all appear to be hermaphrodites.

The principal species is called *vorticella*, from the mouth being surrounded by numerous short feelers, forming a kind of fringe round the head; and, by the motion of these feelers, they form an eddy or vortex in the water, which draws their prey into their mouths. The wheel animal has also the property of reviving after it has been left dry for some months on a glass.

The *volvox globator*, or globe animal, is one of the most curious as well as one of the most beautiful of the animalcules; it is found in the clearer kinds of stagnant waters, and often equals the size of a pin's head. Its general colour is green, but it is sometimes of a pale orange; its motions are irregular in all directions, and at the same time rolling or spinning as if on an axis. When microscopically examined, it presents one of the most curious phenomena in natural history, being always pregnant with several smaller animals of its own kind, and these with others still smaller.

Animalcules are not to be found in all fluids. None are to be found in wines, or any other fermented liquor which has not passed into the state of vinegar, or which has not become completely vapid, neither are they to be found in distilled or spring-water.

They abound as a sort of tad-poles in the semen of all male animals, from man to the smallest insect.

The foul matter of dirty teeth abound in a sort of eels. Diseases of

the skin are generally occasioned by them, or they accompany such morbid parts in various forms.

The little animal which makes rapid circles on water is the gyrinus or water-flea. When disturbed, they dart into the water.

The phosphoric light seen in the ocean is believed to be caused by innumerable quantities of phosphoric insects, and is sometimes so intense as to make the waves appear like red-hot balls.

The whole order mollusca of vermes, are all more or less phosphorescent.

The itch, according to Willan, is caused by an insect, white, with eight reddish legs, to the four hind-ones of which is appended a bristle. It may be distinguished with the microscope in the vesicles in the joints, which accompany the disorder. On the same authority we learn that most of the diseases of the skin are occasioned by other insects.

Cheese mites are found not only in cheeses but in preserves, meal, dried flesh, and other articles of domestic consumption. They have as regular a figure, and perform all the functions of life, as creatures that exceed them many times in bulk; they have a sharp snout, and a mouth that opens and shuts like a mole's: they are so extremely quick-sighted, that when they have been once touched with a pin, they avoid a second touch. The various parts of the body are covered with long hairs, and even these hairs are bristly. From the eggs of the females the young are hatched in twelve or fourteen days, and are so small that ninety millions are not so large as a pigeon's egg. Their manner of feeding is by thrusting alternately one jaw forward and the other backward, and in this manner grinding their food, and after they have done feeding they seem to chew the cud.

Mr. Brown lately promulgated the idea that all atoms were animalculæ, because when diffused in liquids, they obeyed the motion of the atoms of that liquid.

Maton published a similar theory founded on the same mistake, and on the phenomena of revification by immersion.

It is supposed, that the animals and their eggs are involved in the fluids of vegetation, and fixed in the substance till revived.

Some have supposed that vegetation generates them, and that they are primary existences, which expand into larger species of animals.

Polypes are mere naked stomachs, such as are covered and enclosed in higher animals. Nature seems to begin with the *monas*, proceeds to the *polypus*, then to the polypus with *feelers*, *muscles*, *bones*, *nerves*, &c.

Two polypes cut asunder, and joined at either end, become one; and one species may be turned inside out, and live as before.

Sponges are believed to consist of excitable flesh, full of small mouths, by which they absorb and eject water.

Sponge is obtained in commercial abundance at the Island of Sime, near Rhodes. It is brought up by male and female divers, whose endurance of water lasts ten or twelve minutes.

The ZOOPHYTES which produce coral reefs, are of the genera Meandrina, Caryphyllia, and Astrea. The reefs are curvilinear, with a lagoon in the centre, which gradually fills up—the younger and smaller zoophytes being in the inner circle. They raise it to the level of low water, and then stop. Fragments raised from the deep, raise the wall above high-water. Tides and currents carry to it trunks of trees, herbage, &c. and it soon becomes the resort of birds.

Every tropical reef is bristling with corals, budding with sponges, and swarming with crustacea, echini, and testacea. Every tide-washed rock is carpetted with fuci, and studded with corallines, actiniæ, and mollusca.—*Lamark.*

Other crustacea besides corals contribute, yet the increase is not above six inches in a century. If the water therefore is 500 feet deep, the raising of a reef must have employed 50,000 years.

It is impossible to peruse these accounts of the infinite numbers of animals, especially of the insect tribes, without perceiving that the principle of animal life is universal, and almost as common as matter, the distinct existences being perhaps as numerous as grains of sand. All, no doubt, enjoy themselves, and all have common rights to live; while one mortal is not justified in arrogating any right not derived from himself. The final cause appears to be the refixing of the volatized matter of the earth, which they effect by their lungs, air-vessels, and secretions, living themselves, as one result, and as another, returning to the earth, in concrete forms, what is necessary for vegetation, and therefore for all. Hence it is a circle of existence, of which every thing constitutes a part, and to which all, the meanest and the least as well as the proudest and largest, are alike necessary.

The cruelties practised by entomolo-

gists, and collectors of specimens in natural history, are, as matter of mere curiosity, inexcusable, and impeachments of the sympathy and benevolence of the enthusiasts who practice them. Microscopic curiosity often leads also to very great cruelties. All the world have agreed to condemn the monstrous barbarities of theoretical and experimental physiologists. Relatively butchers, fishmongers, poulterers, and cooks, are persons of refined sentiments.

Natural history in living objects, well treated, as at the Zoological Garden or the Jardins des Plantes, is a very amusing study; but in the still life of museums, with all the painful associations of the cruel sufferings of the objects in varied inflictions of death, it is agreeable to none but the unthinking and selfish. Variety of forms is a barren object, but habits and passions of living animals are inexhaustible subjects.

Haller and Cuvier discover the relative proportions of the body to the brain as under:

A child of 6 years	22 to 1
An adult	35 to 1
Ourang-Outang	35 to 1
American monkey	24 to 1
Baboon	104 to 1
Elephant	500 to 1
Ox	750 to 1
Horse	700 to 1
Ass	254 to 1
Sparrow	25 to 1
Canary	14 to 1
Cock	25 to 1
Fox	205 to 1
Tortoise	2240 to 1

The sphinx, satyr, mermaid, centaur, unicorn, hypogreff, hydra, dragon, griffin, cockatrice, &c. are now believed to have been poetical creations of the ancients, though so gravely described by many authors, and introduced as fact, on the celestial globe in a series of real animals. If admitted, they would fill up links in the superior species and remove some difficulties.

It is confidently asserted, that the unicorn of the ancients herds in central Tartary.

The peculiar secretions of animals are as under:—

Castor, near the end of the rectum in the beaver.

Civit, in the same part of the civit cat.

Musk, near the navel of the male musk.

Fœtid emanations in many, when attacked.

Oil, by birds, to lubricate their feathers, taken from the rump.

Poison, by serpents.

Silk, by the larvæ of the silkworm, and the webs of spiders.

The *acrid matter* that passes through the stings of wasps and bees.

The *inky fluid* of the cuttle-fish, in a bag near the anus.

Silky matter produced by the sea-muscle, &c.

Ambergris, an internal production of diseased spermaceti whales.

Spermaceti is produced from the head of the cachelot, and ambergris is the excrement of its intestines.

The *Bezoar stone*, sought as a charm for the cure of many diseases, is produced in the stomach of goats, antelopes, and sometimes camels. Its nucleus appears to be some indigestible hard seed or stone, and its specific gravity is from 1¾ to 2½.

The genus *mephitus* has glands near the anus, which secrete a fœtid acrid liquor, which they squirt on their enemies with unerring destruction to clothes and skin, and so offensive as to be distinguished for a mile or two around.

Animals which live on vegetables have no gall-bladder. It is the same with the pigeon, parrot, and ostrich—and with mollusca.

In some *ruminantia* the intestinal canal is 27 times the length of the animal, and in *rodentia* 15 times: in hogs, 13 times: in the horse the colon is 24 feet, but in the dog only 6 or 8 inches. In the turtle, the intestinal canal is 5 times the length of the body.

The hoofs of animals are similar to the nails of a man, and grow from the roots.

Hair and feathers are analogous to human hair.

Horns of animals are similar, in general, to nails and hoofs; in cows, sheep, &c. they are formed of concentric layers in fibres, like a collection of hairs agglutinated together. In deer, they are bones attached, but in the giraffe part of the skull.

The guinea-pig has 10 teats, the rat 12, and in the hare 10. In a laying hen, the ovary contains a great number of yellow round bodies, each in its own membrane or calyx, which when exuded is received into an extension of the membrane, forming a bunch, of which the outer are the largest. These are the yolks of future eggs, to be provided with whites and shells.

The procreative powers of animals are so various that Linnæus had a design to extend his sexual system to them. Leeches and earth-worms are hermaphrodite, as well as snails and slugs.

The bones of birds are hollow, and filled with air instead of marrow.

Crustacea have teeth within the stomach.

In serpents and fish both jaws are moveable.

In animals that have no circulating system, the air is respired by air tubes running below the skin, called tracheæ, as in insects and mollusca; or it passes through the integuments to every part of the body, as in worms and zoophytes.

The lungs of birds are small, and of a flattened form, and much dispersed; but they respire through the bones and in cavities of the muscles.

All hair is hollow and cylindrical. Young birds are covered with it, and feathers are a variety produced from a bulbous root in the skin.

In the larva of insects there is an air-tube on each side, with branches and several apertures.

The neighing of a horse is effected by a membrane which is attached to a cartilage, and runs along the margins of the glottis. The braying of an ass is produced by a similar membrane, and two large sacs, which open into the larynx. It is the same with the mule. In apes, the bone connected is concave, and hence their noises.

The liquid poison of vipers and other animals is of a yellow colour.

All animals ruminate which have horns and cloven feet.

The periods of gestation are the same in the horse and ass, or 11 months each. In the camel 12 months. In the elephant two years, and in the lion but five months: in the dog and cat two months: in the human female and cow nine months, and in sheep five months. The hen sits 21 days, the goose 30, and the duck 30.

The power of reproduction in insects is one of the most wonderful parts of their economy. On beheading a slug, a new head, with all its complex appurtenances, will grow again; so with the feet of the salamander and the claws of lobsters. The end of a worm split produces two perfect heads, and if cut into three pieces, the middle reproduces a perfect head and tail.

Reproduction is also evidenced in the growth of trees from slips and cuttings, of polype and worms from small fragments, and of the renewal of the claws of crabs and lobsters, with all their nerves and parts in perfection.

The *rete mucosum*, the coloured layer which lies between the cuticle and the skin, is one-sixteenth of an inch thick in whales, and is of the consistence of the grease rubbed between the nave and the axle of wheels. The rete mucosum gives colour to all animals, and Cuvier considers shelly coverings as analogous to it.

In many animals torpid in the winter, the fat in the cellular membrane is absorbed as nourishment. In some, as whales, hogs, seals, &c. it is nearly fluid. In some, the integuments have muscles; as laughing in man, the power of coiling in the hedgehog, of moving feathers in peacocks, turkeys, &c.

Hairs are a sort of vegetation on animals. Their trunks are round, triangular, or square. It may be bleached on grass, like flax, and dyed of any color. It is made to curl by boiling and baking. 1152 grains yield 90 of carbonate of ammonia, 179 water, 288 gas, and 324 coal. It contains silex, sulphur, oil, iron, manganese, and lime. It measures in man the forty-eighth of an inch.

The ossification of soft parts of bodies arises from the deposit of phosphate and carbonate of lime on the part.

Horn is distinguished from bone by its bending, and softening by heat and water. It consists of albumen, some gelatine, and phosphate of lime.

White remarks that all the original quadrupeds of New South Wales are like opossums, and the fish like sharks; while the grasses and trees have equally strong similitudes.

The islands of the Pacific have no animals but the dog, the hog, and the rat, with some bats.

Hogs and dogs were the only animals in the newly-discovered South Sea Islands. The West India Islands contained only a small animal, the agouti. The continent of America contained many large animals, but unlike those of the old Continent.

Asses, hogs, black cattle, sheep, dogs, and cats, introduced into America by Columbus, have increased to numbers beyond estimate. Vast droves of wild asses and buffaloes maintain their pasture, and wild dogs hunt in packs.

When a cow of the black-cattle breed has two calves, one a bull and the other not, this other never breeds, and is of different character in size and habits, and known among farmers as a free martin, having the bellow of an ox, and no sexual propensities. Earthworms, &c. are of both sexes; and caterpillars and larva generally are of no sex till they change. All plants are hermaphrodite, except monœcia and diœcia. Mules and other mixtures do not propagate, and some cause of the same kind affects branches of the human family as stops to population; and hence the continual extinction of families; the males particularly being without offspring, as impotent or withered branches. Swammerdam traces this defect to luxury, and asserts that it arises oftener in royal and noble races than in other families.

Reptiles become torpid when the

temperature is below 40°. Snails, mollusca, and land testacea do the same. In hot and equal climates, as between the tropics, instances of hybernation are unknown.

The sleep of winter and that of night are different in those animals which are torpid for months. The bat, the hedgehog, the tawrie, the marmot, the hamster, the tortoise, the toad, snakes, mollusca, spiders, bees, flies, bears, badgers, &c. retire to their closed holes, and, in various degrees, undergo a temporary death for four, five, six, and seven months of the year. They usually roll themselves up, but bats suspend themselves in caves. Those who lay up provisions use them before they become torpid, and on reviving before they venture abroad.

In digging ponds in the interior of countries it is found that in some countries they soon abound in various fish. The soil having been under the sea in remote ages the spawn may exist in the sand, the fish being vivified by the access of water just as the germs of animalculæ are revived by water in the vegetable substances infused.

A chamelion has a horror of black; a bull, a buffalo, and a viper, of scarlet. Bright yellow flowers decoy perch.

258,936 persons visited the Zoological Gardens in 1831, affording 11,425*l*. It is now the most wonderful assemblage of well-treated living subjects ever exhibited to enlightened curiosity.‡

THE VEGETABLE KINGDOM.§

The terms in botany are very numerous and complicated, and, though generally expressed in Latin, they have clear English synonymes.

There can be no doubt but the definite proportions in which the several elements combine, extend through all nature. Such proportions are the essential relative powers of the elements, and they cannot otherwise combine. This seems, then, to point out true laws of vegetable classification, and the examination of the elementary constituents: this should be the analysis of plants, rather than the external characters either of Linnæus or Jussieu. All plants and vegetable products would then be found to consist exactly of so many proportions of carbon, oxygen, and hydrogen; of so many of the earths, metals, &c. &c.; and in the nomenclature we should, at the same time, express the properties and relative powers of the several products of all vegetation. Probably, it would be found that the parts of fructification are governed by some law of the proportions of some one or two of the elements.

The Linnæan system consists of twenty-four classes, and twenty-six orders, divided into 3,000 genera; the genera into 50 or 60,000 species; and the species into an almost infinite number of varieties. The twenty-four classes depend on the number of stamens, and the orders on the number of pistils.

Botany has always been a favourite study; however, as species and varieties are as numerous as the combination of the elements in various proportions, classification and nomenclature were at all times an object of solicitude. Many attempts, therefore, were made by different botanists, as by Cæsalpinus, Morison, Rivinus, Ray, and Tournefort, who successively adopted most of the distinctions and terms still in use.

But as these were not sufficiently comprehensive and discriminating, Linné, a Swede, or Linnæus, as latinized, began, about the year 1730, to adopt what he called the sexual system, in which he classed them according to the number and situation of the sexual parts, and made the flower and fruit his test of various genera. His first great work was a dictionary of 7300 plants, arranged in classes, orders, and genera, according to this mode of discrimination, improving the old terminology, and giving the trivial or vulgar names.

The twenty-four classes of Linnæus are called, according to the number of Stamens—

1. Monandria.	13. Polyandria.
2. Diandria.	14. Didynamia.
3. Triandria.	15 Tetradinamia.
4. Tetandria.	16. Monadelphia.
5. Pentandria.	17. Diadelphia.
6. Hexandria.	18. Polyadelphia.
7. Heptandria.	19. Syngenesia.
8. Octandria.	20. Gynandria.
9. Enneandria.	21. Monœsia.
10. Decandria.	22. Diœcia.
11. Dodecandria.	23. Polygamia.
12. Icosandria.	24. Cryptogamia.

The orders are as under, depending on the Pistils—

1. Monogynia.	15. Siliquosa.
2. Dygynia.	16. Polygamia equalis.
3. Trigynia.	
4. Tetragynia.	17. Polygamia segregata.
5. Pentagynia.	
6. Hexagynia.	18. Monogamia.
7. Octagynia.	19. Monœcia.
8. Enneagynia.	20. Diœcia.
9. Decagynia.	21. Triœcia.
10. Dodecaginia.	22. Filices.
11. Polygynia.	23. Musci.
12 Gymnospermia.	24. Hepaticæ.
13. Angiospermia.	25. Algæ.
14. Siliculosa.	26. Fungi.

Van Royen, of Leyden, soon after promulgated another system; Gleditch

another system, more simple; and Haller a third: but the system of Linnæus soon prevailed through the civilized world.

His only successful opponents were the Jussieus, who promulgated a natural system, founded on the habits and affinities of plants; and this system is now generally adopted in France, and much respected throughout Europe and America.

Gay Lussac and Thenard have deduced three propositions, which they call *laws*, from their experiments on vegetable substances. *The first* is, "a vegetable substance is always acid whenever the oxygen it contains is to the hydrogen in a greater proportion than in water."—*The second*, "a vegetable substance is always resinous, or oily, or spirituous, whenever it contains oxygen in a smaller proportion to the hydrogen than in water"—*The third*, "a vegetable substance is neither acid nor resinous; but either saccharine or mucilaginous, or analogous to woody fibre or starch, whenever the oxygen and hydrogen, in it, are in the same proportions as in water.

Jussieu divides plants into three divisions: the *acotyledons*, when the seeds are destitute of lobes; the *monocotyledons*, with one lobe; and the *dicotyledons*, with two lobes. The *first* includes what Linnæus calls *cryptogamia;* the *second* is divided into three classes, of four orders, eight orders, and four orders. The *dicotyledons* are divided into eleven classes, containing seventy-eight orders.

Vulgarly, *culmiferous plants* are wheat, *triticum*, which grows best on a stiff or clay soil. Rye, *secale*, grows best in a chalky soil. Barley, *hordeum*, which requires a mellow soil, rather light. Oats, *avena*, which succeeds in the poorest soils.

Leguminous plants are potatoes, *solanum tuberosum*, planted in April. Turnips, *brassica rapa*, sown in June. Pease, *pisum*, sown in February. Beans, *vicea fabia*, sown in February. Carrots, *daucas*, sown in April. Parsnips, *pastinaca*, in autumn. Cabbages, *brassica oleracea*, in March or April. Burnet, *poterium*, sown in March. Beet, *beta*, sown in March.

Herbaceous plants are flax, *linum*, used for linen and oil, grows on a deep sandy loam. Hemp, *canabis*. Rape, or cole-seed, *brassica napus*. Woad, *isatis*, used in dyeing. Hops, *humulus*, used in malt liquor.

All plants require *a definite* degree of heat; and, therefore, their growth and heat are mutual tests. The plaintain requires from 82° to 73°; and, therefore, will not grow beyond the 27th degree of latitude, or higher than 1068 yards; or 1000 toises. The sugar-cane 82° to 73°, or within latitude 36°, or the height of 900 toises. The cotton plant from 82° to 68°, and latitude 34°. The olive requires from 66° to 58°, from lat. 36° to 44°. The vine requires heat from 62° to 48°, and the winter not below 33°. Wheat flourishes at a mean heat of 55°; but when so low as 46°, neither wheat nor barley, nor oats nor rye, come to maturity.

The limit of perpetual *congelation* has been theoretically calculated; it is made 15,000 feet at the equator; and from that to 13,000 between the tropics; and from 9 to 4000 between lat. 40° and 59°.

The peak of Teneriffe presents five zones of different vegetation: for 7 or 800 feet it produces vines, corn, olives, &c. the second zone produces myrtles and trees, the third chiefly pines, the fourth and fifth produces little vegetation, and is very cold; the upper part is covered with pummice stones and lava.

In England, the following is the order in which plants display flowers in spring:—

The furze.
The daisy.
The groundsel.
The hellebore.
The snow-drop.
The crocus.
The mezereon.

In *January* the black hellebore and sweet colt's-foot are in flower. In *February*, the crocus, the snow-drop, the polyanthus, and the hepatica and daisy. In *March*, the early violet, the primrose, the daffodil, the pile-wort, and the red dead-nettle. In *April*, the cowslip, the crowfoot, the harebell, the lady's smock, the wood-anemone, the dandelion, wood sorrel, and the wild yellow tulip.

Field-plants flower as under, on the average of seasons:

In *January*, groundsel, hazel, chickweed, maiden hair, hart's tongue.

In *February*, shepherd's purse, daisy, lung-wort.

In *March*, green hellebore, golden saxifrage, fumitory, speedwell, heart's ease, violet, lady's smock.

In *April*, ground ivy; dandelion, stitchwort, black thorn, buttercup, crow-foot, harebell, bugle, and globe-flower.

From this time till autumn all vegetation flowers; but in October, November, and December, only the mosses and yew-trees; but many flowers blow till Christmas.

Apples ripen in order: the juneating, the codlin, the margaret, the pearmain,

the golden rennette, the russet, the nonparcil, the golden pippin. Those used for cyder are the red-streak, the royal wilding, white-sour, the underleaf, the John, the hanger, and the gennet.

The chemistry of *Vegetation* consists in the decomposition of the aqueous solution of the soils; and recombination of the elementary constituents in the membranes, fibres, and cellular and vascular tissues in the bark, wood, pith, and marrow. The fine membrane forms macilage, and in cells, chiefly hexagonal, pervades the whole plant. The chemical decompositions in plants are believed to be effected in the leaves, in which the sap is exposed to the action of the air.

Vegetables are composed of carbon, oxygen, and some hydrogen, with nitrogen; and they mainly produce gluten, farina, mucilage, oil, and sugar.

The chemical growth of plants is proved by fuci, which thrive without roots; and the epidendrum grows, flourishes, and blossoms, when suspended in a room, merely by decomposing the air and vapour.

Vegetables are therefore believed to derive their support as much from the atmosphere as from the soil, by a galvanic process. The disintegration of rocks, and the decomposition of vegetables aud animals, preserve the equality and necessary variety of soil.

The ultimate and proximate principles of all vegetation are oxygen, hydrogen, carbon, and occasionally nitrogen. The proximate principles depend on the proportion of those elements; as when the oxygen is in greater proportion than water, or less, or equal, or when there is nitrogen. This general division indicates acid vegetables, neutral vegetables, inflammable vegetables, and animal product. The first, where the acids prevail, is the acetic acid, the oxalic, citric, tartaric, benzoic, camphoric, gallic, malic, suberic, succinic, mellitic, saclactic, fungic, and kinic. These acids confer an acidulous character on all vegetables with which they are combined.

When there is an excess of hydrogen, then anctious and inflammable bodies are generated, as fixed oil, volatile oil, resin, caoutchoac, camphor, and wax. In the division containing nitrogen is foand vegetable gluten.

Vegetablea contain, in substance, acids, sugar, gum, mucus, jelly, starch, gluten, and five or six peculiar principles, as tannin, indigo, the bitter and narcotic principle, &c. They also yield oils, wax, resins, &c. In all abont thirty-four several products.

Vegetables yield nine several acids: the oxalic in rhubarb; the tartaric in tamarinds, grapes, and mulberries; the citric in oranges, lemons, and onions; the malic in apples, cherries, &c.; the gallic in elm, oak, &c.; the benzoic in balsamic trees; the prassic in laurel-leaves, peach-blossoms, and bitter kernels; phosphoric in barley, oats, &c.

Vegetable substances are fibroas or saccharine, or mucilaginous, when their oxygen and hydrogen are in the same proportion as water. They are oily or resinous, or contain alcohol, when there is an excess of hydrogen; and they are acidalous when there is an excess of oxygen.

The sap of plants is mucilaginous, albuminous, and saccharine, in the alburnam; and astringent, or tunnin, in the bark. The cambium, between the wood and bark, is a mixture of both. The sap consists chiefly of water, with a small portion of potass, some vegetable matter, and carbonate of lime.

When the oxygen and hydrogen are combined in the same proportions as in water, the substances are not acidulous, bat consist of sugar, gum, starch, wood, or lignam tannin, and what is called extractive.

Light is unfavourable to the formation of saccharine matter in vegetation. Their juices are alike, and they are not inflammable when they grow in the dark. Light produces the varieties of their qualities as well as their colours, all becoming white in the dark.

The evaporation of vegetables consists of water and minute portions of gummy matter, and carbonate and salphate of lime.

Vegetation converts the gas of the atmosphere into an equal bulk of carbonic acid gas, without affecting the azotc. When no oxygen is present, they either form carburetted nitrogen or carburetted hydrogen, always evolving carbon.

A retention of the oxygen for want of light, renders plants white; and its excess produces the same effect.

The metallic poisons and mephitic gases which kill animals also kill vegetables.

The virtues of plants have always been an object of study. Plants are the first decomposers of minerals into their elements; and they also assimilate the constituents of air and water; and, therefore, are nature's chemists. Pharmacy has in some degree superseded them; but till within two or three hundred years, they were medicine as well as food. Their various virtues were seized on by superstition, and for many ages they were connected with the fancies of astrology. The day was divided into planetary hours; and no plant was believed to have its virtue,

unless gathered in the hour of its planet, and also at a particular age of the moon.

Botanists record 56,000 species of various plants; and above 38,000 are to be found in catalogues.

The ancients knew but 1400 species of plants. Britain alone has now 3000.

The flora of distant tracts, even of the same continent, is very different. In distant islands, the flora of each is mostly its own. Thus, at St. Helena, of 61 species, but two or three are found elsewhere. On such data, the Decandolles have arranged the earth in 27 botanical provinces. Subaqueous plants in different seas are also different.

Humboldt considers that the floras of the mountainous Antilles and the Andes are different and particular. He describes the forests as gigantic and wonderful; and such is the overproduction, that the parasite orchis, piper, and pothos on a single fig-tree would cover a large area, while they pass from one tree to another above 100 feet from the ground. He adds, that the bamboo and the fern-tree characterize most strikingly the surprising scenery of the Tropics.

Many thousand species of plants have been lately discovered in Van Dieman's Land. Of the gum-tree there are 100 different species, some of them 150 feet high, and 40 feet round. There are also 100 species of the leafless *acacia*, and these two kinds of trees compose the woods of the country. The eucalyptus or gum-tree grows to 180 feet high and 36 feet round.

Linnæus divided perfect or phanerogamous plants into 1260 genera, and 7540 species, *i. e.* about six species to each genus. Persoon has extended the species to an average of 10 in each genus. Steudel makes out 3376 genera, and 39,684 species, or nearly 12 to each genus. There are besides 557 genera of cryptogamous plants, comprising 10,965 species, or 20 to each genus. Hence, of both, there are 50,649 species; and continued additions are making by botanical travellers.

The generic name resembles the family or sur-name of men; and the name of the species, that of the baptismal name of each individual of the family. As *pyrus*, for the apple family; then PYRUS *malus*, the apple strictly; PYRUS *sative*, the pear; and PYRUS *cidonia*, the quince.

The forests in watered tropical climates are formed of trees from 100 to 200 feet high, which grow to the water's edge of rivers, presenting a solid and impenetrable cliff of trunks 10 or 12 feet in diameter. The dragon-tree is in girth from 40 to 100 feet, and 50 or 60 high; and a misosa, in South America, is described, whose head is 600 feet round.

Though the mountains in South America present every temperature, yet Humboldt no where saw either rose-trees or heaths. All the vegetation of America is different in species from the same kinds in Europe. They often resemble, but are not the same. Humboldt divides the 38,000 species of plants and trees (not cryptogamia) as under:

Europe	7000
Siberia, &c.	1500
Tropical Asia	4500
Africa	3000
Tropical America	13000
Other parts do.	4000
New Holland, &c.	5000

The quantity in lat. 0, 45, and 68, he considers as 12, 4, and 1.

Ferns, heaths, and rhododendrons increase towards the poles; and the rubiacæ, euphorbiæ, and legumes, towards the equator.

America has no heaths. Africa no laurinæ. The southern hemisphere no roses. Of 2891 species in the United States, only 385 are found in Europe. In South America, but 84 species belong to Europe. In Australasia, of 4100 species, less than 100 are found in Europe.

250 new species of plants, and 12 new genera, were lately found on the Zaire or Engaddi, by Smith. New species of animals, &c. were also found, and the river abounds in hippopotimi and crocodiles, and the shores with lions, leopards, &c. &c. The temperature is from 60 to 80.

There are twenty-one species of the pine: among which the cedar is the largest, and the wild, or Scotch, the most important, producing yellow deal, and trunks sixty or eighty feet high. The silver fir is not less valuable for its quick growth and vast size. The larch is another species of rapid growth.

There are sixty species of the pepper-tree.

There are 400 species of heaths, and four natives of this island. In the Highlands they are used in building, for beds, and for malt liquor. They dye an orange colour, with a mordant of alum.

There are 216 species of lichen: of which the *orchall* is purple or crimson dye; the *omphalodes*, paler, but more lasting; and *islandicus*, used as bread and in medicine.

The WOOD of trees is annually formed by a single ring of vessels which at first surround the pith, and in each following year a new ring of vessels is

formed around the preceding; so that the timber consists of a series of annual rings, enclosed in each other. The outer one being whiter and more juicy, and therefore called sap wood, or alburnum.

The Woods which are heavier than water are Dutch box, Indian cedar, ebony, lignum vitæ, mahogany, heart of oak, pomegranite, vine. Lignum vitæ is one-third heavier, pomegranite rather more. Cork one-fourth of a pound or 0.24, poplar 0.383, are the lightest woody products.

Rhodium is the scented wood of the Chinese rose-tree. Yellow saunders is another eastern scented wood. Cassia-lignum is a scented bark from Ceylon. Cinnamon bark is well known for its fine scent. Clove bark is another of these scented vegetables.

An oak-tree in three years grows 2 feet 10½ inches. A larch 3 feet 7¼ inches. An elm 8 feet 3 inches. A beech one foot 8 inches. A poplar 6 feet. A willow 9 feet 3 inches.

Fir contracts in width one 124th, and oak one 140th, by changes in the atmosphere.

South American trees are often 22 feet in circumference. In such trees, 180 feet high, what a wonderful assemblage of cells and vessels preserving organic life in them for above 1000 years! The largest tree is the *eucalyptus*, or gum-tree. It is frequently in Van Dieman's Land 150 feet high, and 25 to 40 feet girth.

Timber is cut down in Canada in winter, by lumbering parties, who build temporary habitations, and are provided with axes, saws, provisions, rum, and yokes of oxen. One-third cut down the trees, another trims them, and the third draws them to the waterside for transport to Quebec.

An elm is full grown in 150 years, and it lives 5 or 600. Ash is full-grown in 100, and oak in 200.

Leaves are coloured in the proportion in which acids and alkalies prevail in them; green indicates an excess of alkali. Solar light is the agent by which the carbonic acid in gas is decomposed. The oxygen is thus expelled, and the alkali produces green.

Fleshy leaves absorb oxygen in the night, and give it out in the sunshine. They produce carbonic acid, and also decompose it; and, therefore, do not vitiate the air. In a close vessel they deteriorate and restore the air.

Deciduous trees are those whose leaves fall off every year, as opposed to evergreens.

The leaves of the *mimosa genus* collapse either by touch or in the night, or by cold; and the foot-stalk, are the most sensitive to touch. The species *scandens* spreads to a vast extent from tree to tree, and has pods eight feet long. The late experiments of Dutrochet led him to conclude that the *mimosa pudica* possesses the elements of a nervous system. He believes that all the motions are spontaneous, and depend on a nervous principle, which receives impressions from external agents.

The *hedysarum gyrans*, according to Linnæus, possesses, in its leaves and petioles, the power of looo motion, seldom being quiescent; the different leaves all over the plant moving variously up and down, round about, &c. without any external cause whatever.

The Flower is the part of fructification in plants, and contains, and protects, and ornaments the stamens and pistils.

The odorous matter of flowers is inflammable, and arises from an essential oil. When growing in the dark their odour is diminished, but restored in the light; and it is strongest in sunny climates. The *fraxinella* takes fire in hot evenings, by bringing a candle near its root, without affecting the plant.

The anthers of flowers have nine several forms, and they contain the fecundating dust which impregnates the germ; they have one or more cells, and stand on one or more filaments.

Plants are mature for propagation as they are ill nourished, and this appears to hold in animals, and the human species.

The colours of flowers depend on light: and the colouring matter which they yield becomes red when an acid is added to it; and violet, blue, or green, when an alkali is added. Flowers decompose no carbonic acid, but they convert the oxygen in the air into carbonic acid.

The Dutch gardens were strait walks with clipt hedges of yew, holly, or box. Kent, Phillips, Brown, and Repton were the fathers of the open English garden.

The taste for flowers proceeded from China and Persia 2 or 3 centuries since.

In Holland, in 1635, legal articles were given for a single root of the viceroy-tulip, equal to 2,500 florins and others for 3,000. The Admiral-Leifkin sold for 4,400. And the Semper-Augustus from 2,000 to 5,500. Twelve acres of land, and often a man's entire property, were given for a root or for a share called a *perit*. It was a mania like that for pictures and black letter books when rank and ignorance meet in the market.

The flower of the *khubut*, of Sumatra, a mere parasite of climbers, is

in breadth three feet; its petals twelve inches; its nectarium would hold six quarts; and its pistils are like cows' horns. It appears as a knob, and expands for three months.

The SEEDS of plants are their eggs. A sun-flower produces 4,000; a poppy 30,000, a tobacco plant 3 or 400,000; and spleen wort a million. Some, as the sea-pink, have but one seed, umbelliferous flowers two, and the spurge and ranunculus three.

The capsule of the white poppy contains 8,000 seeds.

Some seeds germinate after boiling. The seed of plants consist of three parts: the cotyledon or side lobes, the radicle and the plumula. The radicle is the germ of the root, and the plumula the stem of the plant. And germination depends on heat, moisture, air, and rest.

Nature in organization seems to begin from the minutest and to expand in successive states of being—atoms and animalculæ—then vegetables, insects, and larger animals.

All FRUIT consist, in various proportions, of water, sugar, potass, malic acid, mucilage, tannin, gelatine, and a flavouring and colouring principle. The essentials in making wine from them are the sugar, tartarous acid, mucilage, and water. Flavour, colour, and tannin are not essential. The tartarous acid distinguishes wine, and the malic cyder. The sugar, by fermentation, yields the alcohol, with extractive vegetable matter.

Fruit is the sustenance of the seed, and resembles the after-birth, or placenta, of viviparous animals.

The substance of fruit varies as it matures. Green apricots afford no sugar, but more advanced .066, and when ripe .165. The woody fibre is .036, then .025 and .019; the proportion of water also is .89, 84, and .75.

Fruit put into an atmosphere that contains no oxygen, does not ripen; but the ripening process commences when oxygen is supplied. The total weight of fruit in ripening is very little diminished. Heat produces saccharine matter in fruits; and heat without light will mature them.

The process of germination changes oxygen gas into carbonic acid, but does not affect the azotic portion of the atmosphere; it is supposed that the seed absorbs the oxygen, and gives out the carbon.

In a pear, shut in a close vessel for seventeen days, the ingredients were much changed: the sugar was doubled; and the gum, water, and woody fibre had decreased. 100 parts of the air contained 13½ of carbonic acid, 7½ of oxygen, and 79 of azote.

The fibrous tissue of silk is said to be visible in the white mulberry, on which the worms feed.

Grew and Malpighi have given the following account of the structure of the apricot and pear, which may serve for other fruit. In the apricot there is a pulpy part, an osscous part, and in the centre the kernel; and the pulp and the stone, or osseous part, consist of cellular tissue. The seed is connected with the stone by an umbilical cord. Within the ovulum is an inner tunic filled with cellular tissue, and a small tube, the apex of which is the embryo, which when but the fifth of a cheese mite in size, may be distinguished in its parts. The pulp of the pear is made up of very fine cellular tissue, every where furnished with vessels. In the centre are five cells, each containing two seeds, severally attached by an umbilical cord. Throughout the pulpy matter solid particles are dispersed, chiefly about the core, and they serve as centres to little knots of vessels, of which there are fifteen principal ones, and ten of them connected with the seeds. These subjects are only to be understood by ocular examination with a moderate microscope, for even the best engravings convey very inadequate notions.

Palms are the most useful productions of Ceylon. First the cocoa-nut, in universal use for food, drink, and the arts of life. The palmyra nearly as valuable. The areca catechu, whose nuts, the betel, and the chunan are the universal luxury of Asiastics. A tree produces from 500 to 1,000 nuts. The sago palm, whose pith dried and granulated is in use through Europe, and also prolific in sugar. The talipot, famous for its large leaves, which shelters 15 or 20 men, and its fruit. The jack produces fruit as large as a man's body, filled with delicious pulp, and with seeds as large as chesnuts, of which many dishes are made.

A Cingalese family live at ease on the produce of a dozen cocoa-nuts and three or four jack-trees.

The chique-chique PALM of the Amazons produces abundance of exported hemp for cordage, and is cheap.

South America contains 80 or 90 species of PALMS. The fruit is farinaceous, yellow, sweet, and highly nutritive. Each tree bears 3 clusters, with from 50 to 80 large nuts in each. Linnæus thought that the countries of palms were the first abodes of our species, and that man is essentially palmiverous.—*Humboldt.*

BAMBOO is, in the torrid zone, and in

the East, a production of various most important uses, and grows from fifteen to sixty feet high, being from five to fifteen inches in diameter. It is well known by its hollowness and its joints; it grows rapidly, as much as twenty feet in a few weeks. It flourishes wild in many places; and in China, and other countries, is carefully cultivated in plantations. The soft shoots are cut and eat like asparagus, and sometimes salted, and eat with rice. The hollow joints afford a liquid drank by the people; and if not drawn off, a concrete medicinal substance is formed, and much valued. Decoctions of the leaves and bark are also prescribed. Its seeds are eaten as a delicacy; its large joints are used as buckets; and, in many countries, no other wood is used for building houses. Ships are framed out of it, and it furnishes masts and yards. Its leaves make fans. It is also used to make bows, and instead of lead pipes to convey water to great distances. It also forms writing pens, and is woven into baskets, cages, hats, &c.; bruised into pulp, it makes fine paper; it is also used for every kind of furniture, and we imitate it in Europe by painting the knots of chairs and tables.

The banana, or plaintain, is the most useful of trees. Its fruit, 12 inches long and two thick, serves for bread; the leaves serve for cloth and covering; the root is perennial, but the stalk is annual, and grows to 15 or 20 feet. An acre planted with bananas yields 20 times more aliment than in grain.

The banian is the sacred tree of the Hindoos. Every branch shoots a new root to the ground, so that they spread indefinitely, and afford shady retreats for comfort and religion.

The cocoa-tree supplies the Indians with almost whatever they stand in need of; as bread, water, wine, vinegar, brandy, milk, oil, honey, sugar, needles, clothes, thread, cups, spoons, basons, baskets, paper, masts for ships, sails, cordage, nails, covering for their houses, &c.—*Ray*.

Our *Cocoa* is the cacao of the West Indies, and is the seed of the cacao-tree. Twenty-three millions of lbs. are consumed in Europe, and it is the general beverage of Spain.

Cocoa-trees are from 40 to 60 feet, with leaves 12 or 14 feet long, with 6 or 9 clusters of 10 or 12 nuts, near the top. They produce timber, coverings for houses, oil, arrack, and cordage. The oil is used and preferred all over the East for light and soap, and excellent candles and soap have been made from it in London, clearer and sweeter than tallow or whale-oil. Ceylon exports three millions of lbs. of cordage only.

Chocolate is properly cacao-nuts roasted, powdered, mixed with water, and dried in cakes. But in England it is adulterated with flower and Castile soap.

The mahogany-tree is a native of Cuba, Jamaica, &c., and grows from 60 to 100 feet high, with deep-green foliage, orange-coloured flowers, and fruit the size of a large egg. Mahogany was first imported and known in England in 1724. The present imports are 20,000 tons per annum. It is one of the most majestic trees, single blocks often weighing six or seven tons. The trees are cut in forests called *the bush*, by *gangs*, who have then to open new roads to draw it to the water-side.

The COW-TREE of South America grows in rocks. It has dry and withered leaves—its roots scarcely penetrate the stone, and it enjoys little rain, yet when pierced, and especially at sun-rise, it pours out streams of sweet and rich milk, with which the Indians crowd to fill their bowls, and make a nourishing repast.

The people of Kebba were employed in collecting the fruit of *shea*-trees, from which they prepare *the vegetable butter*. These trees grow naturally in the woods, and in very great abundance; they resemble the American oak; and the fruit, from which the butter is prepared, is not unlike a Spanish olive. The kernel is enveloped in a sweet pulp, under a thin green rind; and the butter produced from it, besides the advantage of its keeping the whole year without salt, is whiter and firmer, and, to my palate, of a richer taste than any butter I ever ate made from cows' milk.—*Park*.

The date, in all tropical countries, is one of the most common trees, and grows from 50 to 100 feet, affording food, clothing, &c.

For 70 years, a tree yields from 250 lbs. to 400 lbs.

The *clove-tree* grows to 40 or 50 feet, bears at 20, and continues till 50; they yield from 5 to 30 lbs. per annum. This spice is cultivated chiefly at Amboyna, and three adjacent islands. When possessed by the English, the islands yielded about 120,000 lbs. per annum, which sold for £20,000. The same mercenary despotism on the part of the Dutch prevails here as at Banda.

The cinnamon-tree is a species of laurel, and is a native of Ceylon. It grows to 20 or 30 feet, and its trunk and branches produce the bark.

Cork, whose specific gravity is 0.24, or ¼ that of water, is the bark of a tree called *quercus suber*, which flourishes

in southern Europe and northern Asia. It falls from the tree at 12 or 15 years old; but for commerce they are stript for several years successively, and then allowed an interval of two or three years. The young trees are stript only every third year. It is flattened by being piled up in damp places, and loaded with weights; it is then dried over fires for use. As a bad conductor of heat it is used to increase the warmth of apartments, and as the lightest and most elastic of the woods no substance is more generally useful.

The Nutmeg-tree bears fruit from 10 years old to 100; the leaves resemble the laurel; the flowers are white, two or three on a peduncle. The nutmeg proceeds from a reddish nob in the centre of the flower, but not more than one-third ripen. The fruit is the size of an apricot, pear-shaped. When ripe, it opens and displays the nutmeg in a black and shining shell, enclosed in net-work of scarlet mace. The shell is like that of a filbert; it is dried with care, and when the nutmeg shakes in it it is broken, and the nutmeg soaked in sea-water and lime to preserve it from insects. There are three sorts, the wall nutmeg, the royal, and the green. About 190,000 lbs. are exported and sold in Europe, and 50,000 are sold in India. In the three years in which the islands were in possession of England, they yielded about 84,000 lbs. per annum, at 10s. per lb.; and 40,000 lbs. were sold in India. During the English possession, from 1802 to 1805, the quantity of mace was 8000 lbs. per annum; and 1800 lbs. for India, at about 45s. per lb.

Nutmegs are now raised at Penang, and in abundance at Bencoolen. Plants were tried in the West Indies, and failed. The trees come into bearing in seven years, and the annual produce of a tree is 3 lbs. of nutmegs, and 1 of mace. There are eight varieties; and the trees are male and female, the latter only bearing fruit. In Great Britain 60,000 lbs. of nutmegs, and 4000 of mace are consumed. *Curtis's Botan. Mag.*

The *morus*, or mulberry-tree, has several species. The white, feeds silk-worms in China, the leaves sheep, and the branches make fire-wood. The black produces the best fruit. The bark of the *papyrifera* species is employed in Japan to make paper, and it also makes fine white cloth.

The pimento or all-spice is a species of myrtle in the West Indies, which grows thirty feet high.

The coffee-tree is evergreen, and like the bay-tree 8 or 12 feet high, which flourishes in countries in which the thermometer does not fall below 55°. It travelled from Persia and Arabia to France, and thence to Martinique in 1732, whence it has been spread through the West Indies. It was first sold at Constantinople about 1550, and in London in 1650. The trees begin to bear at two years, and the ripe berries are procured by the Arabs, by shaking the trees over a cloth, each bushel yielding 10 lbs. of coffee for use. The berries are then dried and fermented, and the husks separated in a mill. The seeds are delicately roasted before ground. 140 millions of lbs. are now annually consumed in Europe.

The SUGAR-CANE is a tall reed. The soft parts are eaten by the negroes, and from the hard parts the juices are expressed, which by boiling and evaporation chrystallize as sugar. It was cultivated in China 2000 years ago. It travelled thence into Arabia and Egypt, and afterwards to Sicily, Spain, and the West Indies. The plant is from 12 to 20 feet high, and propagated by cuttings, renewed every four or five years. The canes are cut down close to the ground, and then pressed through cylinders in a mill. The juice is then boiled briskly, and every 5 gallons affords 6 lbs. of crystals of sugar, as the produce of 110 good canes. It is then put into casks, and the drainage is molasses, or the uncrystallized part. This, with the skimmings, is fermented and distilled for rum. The sugar-plant is called the *saccharum officinarum*.

The importation of sugar now employs 200,000 tons of shipping, which, on the average, supply 20 lbs. of sugar to every man, woman, and child in the United Kingdom.

A new method of preparing sugar for importation, has been adopted at Demerara, in fine crystals, resembling Epsom salts; by which it will pack up closer, employ less tonnage, and require no refining in Europe.

Tobacco was brought to Europe from Tabaca in St. Domingo, by a Spaniard, in 1559, and sent from Lisbon to Paris by Nicot, the French ambassador. Several bulls were published against it and snuff, and heavy punishments imposed in several countries.

In Virginia, *Tobacco* is a very exhausting crop, and severe labour attends the operations. An acre yields about 1400 cwt. The United Kingdom imports of it 21½ million lbs., and only ⅔ds of a million from other countries. It is however grown every where, except in this revenue-ridden country, where the duty is eight or ten times the price of the article.

Onions can never be sufficiently recommended; they possess more nou-

rishment than perhaps any other vegetable. It is a well-known fact, that a Highlander, with a few raw onions in his pocket, and a crust of bread or a bit of cake, can work or travel to an almost incredible extent, for two or three days together, without any other food. The French are aware of this: the soup de l'onion is now universally in use after all violent exertions, as the best of all restoratives. Whoever has tasted onions in Egypt must allow that none can be had better in any part of the world; here they are sweet, in other countries they are nauseous and strong, whereas in the north, and other parts, they are hard of digestion: hence, they cannot in any place be eaten with more satisfaction or less prejudice than in Egypt. They eat them roasted; also made into a soup, which I think one of the best dishes I ever eat.—*Hasselquist.*

The *tcha*, or tea tree, flourishes best in a light soil: it is raised from seeds sown in spring and transplanted in rows three or four feet asunder. After three years the leaves are plucked, and the plants yield three years' crops and are then renewed. They resemble myrtles, and their flowers are like the wild white rose. In some provinces, they grow six or seven feet high, and in others ten or twelve. They are often made use of for hedge rows, and the leaves gathered for domestic use. The leaves at the extremities are the best, and in spring of bright green. When gathered, they are first steamed, and then placed on copper, iron, or earthen plates over fires, by which they are shrivelled and curled up. The black teas are then exposed to the sun. The leaves of some other shrubs are so like that they are often fraudulently mixed. The common sorts are sold in China at 4d. a pound, and the superior at 2s. The additions in foreign countries arise from freight, profit, and government, duties, and the profits of the Chinese merchants is from 25 to 50 per cent. The duties in England are cent. per cent. on the price at the company's sales.

Green teas are chiefly produced in the province of Kianguan; the difference is believed to arise from the black being dried on iron plates, and the green on copper plates. The *songlo* green teas are so called from a mountain of that name, on and round which the shrubs grow. *Haysuen* or hyson is sold at double the sanglo. Tchu-tcha or gunpowder tea is rolled up by the hand, and sold at treble the sanglo.

The Chinese keep tea a year; generally in those jars which in Europe are used as chimney ornaments. They infuse it in boiling water, and drink it without milk or sugar. They frequently reduce it to fine powder, and put a tea-spoonfull into a cup, fill it with boiling water, stir it, and drink it. The Japanese cultivate this shrub as well as the Chinese.

Black teas are grown chiefly in the province of Fo-kien. The Chinese prefer it to green tea, as a better stomachic; the commonest sort is called *bouy* or bohea. Congou or *congfoo* is a finer kind, sold at double the price. *Saot-chong* or souchong is the best kind and sold at treble. *Pekao* is another superior kind, but milder. The tender leaves of young plants are called *mastcha*, or tea for the emperor.

The best tea drank in China is the *yu-tien*, consisting of the youngest buds of the tree.

The tea of Paraguay is called caa. It thrives best in marshes, and the gathering the leaves is an obnoxious and very unhealthy employment. It is, however, the common beverage, and deemed a good stomachic.

In 1816, a plantation of 3000 Chinese tea-trees was made in Brazil.

Tea was first introduced about 1660, and sold at 60s. per lb., and hence coveted as a luxury. 30 millions of lbs. are now used in the United Kingdom.

About 4 millions of lbs., or one-fifth, of sloe, liquorish, and ash leaves, are alleged to be annually mixed with tea before it is sold to retailers.

The COTTON PLANT, or *genus gossypium*, contains 10 species, and is extensively cultivated in warm climates. It belongs to the class *monodelphia*, and the order polyandria. The seeds are enclosed in a capsule, and involved in the filaments called cotton. The plant is raised from seed sown in holes in the spring months. The superfluous plants are pulled up, and the others pruned to the height of four feet.

The seed springs up in a few days in showery weather, and the cluster of plants is weeded when they are a few inches high. The tops are pruned to increase the branches. They yield in seven or eight months, and the crops improve for two or three years, and every four or five years the plants are renewed. The blossoms, a double calix exteriorly, three cleft, appear in July and August, the pods opening in a few weeks, and the first crop being picked in November and December. The rainy season then produces a second crop, picked in March and April. The pods are then dried in the sun till the seed becomes hard, and the seed is then separated from the cotton by a gin. It is then picked and packed for market. Its great enemy is

the caterpillar, called the chenille. An acre of cotton-trees, under favourable circumstances, yields 400 lbs. of cotton. The pods are the size of small apples, and filled with cotton, surrounding the seeds.

The cotton plant cultivated in the United States, Persia, Sicily, and Malta, is herbaceous, and only 18 or 20 inches high, sown and reaped like corn. It produces a yellow flower, purple in the centre, with a pod the size of a walnut, full of seeds and fleecy down. When the pod bursts, the plant is ripe.

The tree cotton flourishes in Arabia, Egypt, and India, and is 15 or 20 feet high. Another species grows in the Mauritius, and a third in China, of the colour of the nankeen made from it.

The shrubby cotton flourishes in Georgia, and is 5 or 6 feet high, known as Sea Island. It endures 5 or 6 years, and an acre yields from 150 to 250 lbs. The cotton and seeds are taken from the husks on the trees, and 50 or 60 lbs. of the seeds are separated by a gin per day, or 8 or 900 lbs. by a steam-engine.

In Louisiana, the plants yield for market 1½ to 2 cwt. per acre.

The *teasel*, used in raising the nap in woollen cloths, is the flower of the *dipsacus fullonum*, cultivated in clothing districts. They are fixed on a cylinder revolved against the cloth. They are chiefly grown on strong soils in Gloucestershire, &c. and are very important crops. They are sold in packs of 9 or 10,000, at 6 or 7*l.*, and a pack is used in 6 or 7 pieces.

The moss, *sphagnum palustre*, constitutes the *peat* of Europe. It has the property of throwing up new shoots in its upper parts, while the lower are decaying. Time is believed to convert it to lignite by the action of water. 100 parts have above 60 of hydrogen and carbon. It covers a tenth of Ireland. An overturned tree lying on a damp soil soon forms a covering of peat moss—a number of them a peat bog. A wood and a storm will always form peat, and in time beds of coal. The iron and its oxide are supposed to be precipitated from the vegetables. On the sides of mountains, peat is 3 or 4 feet thick, but in vallies, &c. often 40 feet. In hotter climates, vegetables putrify, or are devoured by insects, but in colder ones they form peat. Trees are found standing in peat-bogs.

The parasitical vegetable which occasions the dry-rot in ships is a gigantic leather-like fungus, called *xylostroma giganteum*, or oak-leather: and that which causes the dry-rot in houses is a parasite of fir called *voletos lacrymans*. The fungus appears to grow on the timber, and extract its cohesive parts. Wet-rot has no fungus, but separates rather than decomposes the fibres of the wood.

Dry-rot first appears in the sap-vessels of the alburnum, and on the surface beneath the bark. It is reticulated, but as it proceeds the meshes are filled up, and a leather-like fungus appears, called the *xlostroma giganteum*. Fermentation, as in the case of mushrooms, seems essential to the growth of fungi which accompany dry-rot, and hence live trees are not affected by the seeds of fungi, or they might be converted into mushrooms, and other fungi.

Fairy rings are ascribed to expanding fungi, which in a circle of enlarged dimensions exhaust themselves.

The first green incrustation on rocks and walls, called *byssus*, a species of moss, leaves a thin stratum of earth for a second crop; and, in fine, for wall plants.

Lichens and mosses are the first vegetables that grow on rocks: and in long time they create soil for others by their remains.

In the *pitcher plant* of New South Wales, there is a lid with a hinge, by which it opens and shuts. It is generally half open, and contains fluid in which ants and flies get drowned. The pitcher is attached to the foot-stalk, and supposed to be the means of nutriment instead of the root.—*Vide Curtis's Bot. Mag.*

The basons made of the leaves of the wild pine will hold a pint and a half or a quart of water; and when they find these pines, they stick their knives in the bases just at the roots, and that lets out the water, which they catch in their hats, as I have done many times myself.—*Dampier.*

Hops entwine to the left, and convolvulus to the right. Tendrils bend to the left and back again.

Ivy does not kill trees, nor does it grow from their bark.

A similitude has been established between feathers and vegetable prickles in their offices.

A large onion planted so near a rose-bush as to touch its roots, will greatly increase the odour of its flowers; and the water distilled from such roses is far superior in flavour to other rose-water.

No insect will live near the *sandal*-tree, and iron will not rust near it.

Wappertoo is a bulbous root, which roasted is equal to the potatoe, and eaten on the western coast of North America.

White *clover* springs up on mixing lime with dry heaths and barren soils; and raspberry-bushes spring up where

fir-woods are burnt down. Other plants rise also as underwood in the decayed fragments of fir-trees, though in each case strangers to the vicinity. In the first case, dormant clover-seeds are supposed to be excited by the lime.

In turning up soil from great depths, new varieties of vegetables generally arise. Old garden spots newly dug up exhibit the revival of seeds long buried. At Kingston-on-Thames, soil brought up from a depth of 360 feet, and then covered with a hand-glass, exhibited speedy vegetation.

As the sea retires from a shore various plants spring up, wholly strange to the neighbouring land.

It was the *misletoe*, parasite of the oak, which the Druids reverenced. Similar superstitions prevailed in Greece.

Grape-wine used to be produced in England, and might still be produced, if the vines were pollards or trained near the ground as in France, instead of being trained to the height of the tree.

The leaves of the *haw-thorn* are found to be an excellent substitute for Chinese tea.

The herb-shops in London have 500 species on sale.

The Botanical and Horticultural Establishments in England of pre-eminent interest are that at Kew, a royal establishment, which contains specimens of all indigenous plants, and of many rare and other exotics, classed and arranged in fine order. The Horticultural Society's Gardens, at Turnham Green, consisting of an arrangement of all fruit-trees and vegetables which can be grown in this climate. The Horticultural and Botanical grounds of Mr. Samuel Curtis, of Glazenwood, between Coggeshall and Braintree, consisting of 50 acres of all the flowers and fruits which bear the English climate in rich and tasteful display. Loddige's Nursery Grounds at Hackney, claiming notice for his superb palms. The Duke of Northumberland has also the most extensive and costly conservatory in Europe at Sion, in Middlesex. Other noblemen and gentleman are proportionally munificent in their encouragement of these pursuits, and there are well-supported establishments at Edinburgh, Chelsea, Manchester, Liverpool, Oxford, Cambridge, &c.

The only indigenous fruit of Britain were the sloe, currant, black-berry, straw-berry, cran-berry, elder-berry, hips, haws, acorns, hazel-nuts, and beech-mast. Carrots, celery, beet, sea-kale, and mushrooms were our primitive vegetables.

Sea-kale became edible on the suggestion of W. Curtis, about 1780.

In the reign of Henry VIII. the London markets were supplied with vegetables from Holland and the Netherlands.

The exotics, hardy and tender, introduced into England, are 11,970 species, 47 before Elizabeth, 533 in her reign; 964 in the 17th century, and the remainder since, or above half since 1760.

Sallads, artichokes, carrots, and turnips, were first cultivated in England about 1530. Cauliflowers in 1680. Hops and spinach in 1520. Pine-apples in 1696. Potatoes and tobacco in Ireland in 1603.

The Saracens introduced the sugar-cane into the islands of the Mediterranean and Old Spain, where these plantations still flourish. Hence it was conveyed to the Canaries, and then to the West Indies. Whether it was indigenous there, or the Spaniards only indicated its use, is uncertain.

The fig, vine, olive, and pomegranate, are the earliest noticed fruit-trees cultivated by mankind in the temperate zones. In the tropics the orange, cocoa, citron, lemon, banana, date, &c. &c. would by nature be forced on attention.

Italy was supplied with the fig from Syria, the citron from Media, the peach and nectarine from Persia, the pomegranate from Africa, the apricot from Epirus, the apple, pear, and plum from Armenia, and the cherry from Pontus. From hence they have been spread over Euorpe.

The fig-tree was introduced about	1548
Lavender	1568
Laurestina	1596
Different mulberries, 1548, 1596,	1629
The larch	1629
Common laurel	1579
Weeping-willow	1692
The flowering-ash	1710

Roses came to us from Persia, and into Persia from India. They abound in the countries round the Caspian.

The potatoe was a native of Chile.

Turnips were introduced into England from Hanover, in the reign of George I., by Viscount Townsend.

The Danary oak, near Brentwood, was sixty-eight feet round, and seventeen feet above the ground; was twelve feet in diameter.

A chesnut-tree on Etna is 196 feet round close to the ground; and five of its branches resemble great trees.

A sitting-room, twelve feet in diameter, was lately shown in London, hollowed from an American walnut-tree, eighty feet in the trunk, and 150 feet in the branches.

A chesnut-tree grew at Tamworth, which was fifty-two feet round; it was planted in the year 800; and in the reign of Stephen, in 1135, was made a boundary, and called the Great Chesnut Tree. In 1759 it bore nuts which produced young trees.

Dry reeds, twenty feet high, oover tracts of hundreds of square miles in the Burmean territory.

The *lotus* of the Egyptians is a species of nymphæa, or water lily, with a flower like a tulip, white or blne. The roots of the white are eaten like potatoes.

The dendrometer is an instrnment for taking the exact contents of standing trees, boughs, &c.

Hot-houses are now most advantageously heated bv hot-water, a plan first adopted by Mr. Peter Marsland, of Stockport, by which be supplied the tables of London with pines and grapes throughout eleven months of the year.

Henry VI. forbade the planting of hops, and Henry VIII. forbade the nse of "hops and sulphur." They now occupy nearly 50,000 acres, and flavour and preserve the eight millions of barrels of beer brewed from 30 millions bushels of malt.

The Bushy Labyrinth at Hampton Court, called the Maize, is an imitation of one in Holland, but the largest and most intricate in Europe is that at Versailles. That at Hampton Court stands on two acres of gronnd. There were two ancient ones at Crete and in Egypt, but instead of hedges built with walls.

Dr. Charles Hutton, who hated superstition in every form, asserts that in his presence, and that of other persons, a lady detected a spring of water by the bending downward of a *hazel-twig*.

The fragrance of the *carnation* led me (says Sir John Hill,) to enjoy it frequently and near; and while the sense of smelling was satiated with the powerful scent, the ear was constantly attacked by an extremely soft but agreeable murmuring sound. I distended the lower part of the flower, and placing it in a full light, could discover, by means of apparatus, troops of insects frisking and capering with wild jollity among the narrow pedestals that supported its leaves. I admired their elegant limbs, their velvet shoulders, their backs, vyeing with the empyreum in its blue, and their eyes, each formed of a thousand others, out-glittering the planes on a brilliant.

Snuff-taking in England took its rise from the capture of vast quantities of the article in Sir George Rooke's expedition to Spain, in 1702. The prize of the forces was sold in England, and gave rise to a habit now general, and which yields a million a year to the revenue. It is useful only to those disposed to apoplexy, increasing the secretions, and acting like a seton. There are above 120 several sorts in some of the London shops, as at Taylor's, in Fleet Street, &c. consisting of tobacco-powder, with various admixtures, scents, &c.

Cocoas, pandanas, and mangroves are the first trees of coral reefs; and pines, oaks, and chesnuts soon rise on streams of cooled lava.

Flinders suggests the advantage of planting cocoa and other productive trees on all sand-banks, &c. for the relief of wrecks.

The three oceans present vast extents or banks of sea-weeds, often like meadows. They prevail west of the Azores, between lat. 25° and 36°.

Most seeds pass unchanged through the intestines of animals.

In the West Indies, the negroes prefer their own preparations of the plaintain fruit to bread; and hence the bread-fruit tree, transported at such an expence from the South Sea Islands, has been attended with no success in the colonies.—*Young*.

The fertility of the West India Islands has been greatly abated within memory—the crops being but half or a third, owing to the exportation of the produce, the want of renovating manure, and the diminution of rain from cutting down the woods; for the spiculæ of leaves diminish the electricity of the clouds, and produce their fall, and mountains rising through clouds operate in like manner, so as to become the sources of rivers.

Vines of the most delicious kinds are indigenous on the Arkansas, and cover the country.

Vegetable butter is in general use in Africa, and potted for preserving; also palm-oil.

The cypress flourishes in gigantic size when its roots are six months of the year under water.

When trees are felled in the lofty forests of the Alps, they are then conveyed to the water by slides. The slide of Alpnach, on Mount Pilatus, is above eight miles long, and consists of 25,000 trees, stript of their bark, laid at an inclination of 10° to 18°. The trees run down it in six minutes.

An acre of ground will contain 43,560 plants, at 12 inches apart; 19,360, at 18 inches; 10,890, at 2 feet; and, of course, 4,840 a yard asunder; 2,722, at 4 feet; at 10 feet but 435, and at 20 feet but 108.

Sundry Products in Alphabetical Arrangements.

Aloes are soccotrine, hepatic, Cape, and horse.

The heart of the *aloes-tree* sells in India for its weight in gold, under the name of tambac.

Alkanet-root is used to colour lip-salve.

Amber is considered as the gum of a tree now extinct, or an exudation from the roots, by which it entangled toads, insects, &c.

Assafœtida is the product of the root of a Persian plant.

The charcoal of the *areca-nut* makes a valuable tooth-powder.

Argol, or archel, is a mordant substance obtained from lichens, used by dyers to improve and fix colours. It is brought from Elba and the Levant.

Arnatto is a dyeing substance, prepared from reeds which grow in the West Indies and Cayenne.

Arrack is made from the juice of the tops of cocoa-nut and palmyra-trees. At Batavia it is made from *paddee*, rice in the husk.

Arrow-root is a native plant of South America, and cultivated in the West Indies. It is a creeping root, with stalks about two feet high, and the roots pounded and bleached make the starch which is used as nutricious food. It was supposed to be an antidote to the poison of Indian arrows, and hence its odd name. Linnæus calls it *maranta.*

The *aromatics* in general use are cinnamon, nutmeg, cloves, orange and lemon-peel, pepper, peppermint, spearmint, cardamom, carroway, anise, coriander, ginger, and dill and cummin seeds.

Balm of Gilead, or balsam of Mecca, is made from the resin which exudes from incision in the bark of a plant belonging to the genus amyris, which grows near Mecca and in Abyssinia; its virtues are frequently extolied in the Jewish scriptures. The balsams of Tolu and Peru are made from resins which exude from South American plants. In the East its applications are various.

Balsam of Peru is a decoction from the plant *peruiferum*, which grows in Africa and Peru.

Bdellium is a semi-transparent resin.

The *betel*, or pawn, chewed in the East by both sexes, like tobacco, consists of the fruit of the areca palm wrapt in leaves of the hetel pepper plant. The fruit grows in clusters, of a reddish colour, and the betel pepper is a species of vine with an ivy leaf; both are cultivated to an immense extent all over India. Lime is used with the betel-nut called *chunan*, and is prepared from calcined shells. This prevents any injury to the stomach. The chewing reddens the saliva and turns the teeth black, but it creates appetite and strengthens the stomach. Women chew it constantly, and the Singalese sleep with it in their mouths. It is the snuff and tobacco of the Hindoos. The quantity imported in some of the British settlements is from 1 to 200,000*l.* per annum. Many Hindoos would rather want food than the betel.

The *belladona*, or deadly night-shade, produces berries like black cherries, which often poison children and cattle.

Peruvian and cascarilla *bark*, and camomile flowers, are powerful tonics.

The *bitter* principle prevails in quassia, gentian, hops, camomile, and some others; it has been made artificially by chemists as quinine.

Bird-lime is prepared from the berries of the missletoe and the middle bark of the holly; it is boiled till it becomes soft.

Catechu is the boiled heart or leaves of a tree or shrub which flourishes in the Burman empire and in Concan, on the Malabar Coast. It is an inspissiated tan, and the most powerful known astringent, 1 lb. being equal in tanning to 7 or 8 lbs. of oak bark. It is an abundant article, and long used in India and China in componnding their betel.

In analyses, 200 grains are found to contain 100 of tannin, 70 of a peculiar extract, 15 of mucilage, and 15 of earthy matter.

Caoutchouc, or Indian Rubber, is formed of a gum which exudes by incision from two plants which grow in Cayenne and the Brazils, called *hævia caoutchouc*, and the *jatiopha elastica;* the resinous substance, as it hardens, being formed round clay moulds. The *urceola*, which grows in the Indian seas, also affords this gum, as well as some other plants. Its specific gravity is 0.9335. It is very inflammable. When distilled, it gives out ammonia, water, oil, and charcoal. It abounds in Cayenne; but on the Oroonoko there is a similar substance, the *dapitcho*, dug out of the gronnd, and formed into solid tennis-balls, and nsed for corks, or in long pieces, as drum-sticks. It is found near the roots of the jacis and curvana. The resin copal is another variety, and amber may be another.—*Humboldt.*

Mr. John Hancock,. of Fulham, has discovered a method of manufacturing it into an infinite variety of useful articles. As the slowest known conductor of heat—as a substance wholly impervious to all moisture—and the most pliable, elastic, and durable of all solids—it possesses more uses in the arts of life than can be

briefly described. He announces 30 or 40 of its applications, and an inspection of them in Agar Street, Strand, is a gratifying novelty in British manufactures. It has so few chemical affinities, that it is most useful as pipes for fluids, and for holding liquors. It does not vibrate, and is therefore the only material for acoustic tubes and conductors of sound. It is a convenient enima, and a simple stomach-pump. Also an infallible means of obtaining copious perspiration in rheumatism, gout, lombago, &c. &c.

The *cinchona*-tree, which produces the Peruvian *bark*, flourishes chiefly in the elevated plains of Quito.

Rhubarb, jalap, pulp of cassia, bitter apple, aloes, senna, and oil of croton seeds, and castor seeds, &c. are used as *cathartics*.

Colchicum smoked, relieves asthma; and, as a tincture, relieves rheumatism.

Tincture of chirayita is used as a stomachic; and the essence of bucho leaves for diseases of the bladder.

Cudbear is a vegetable substance, which grows on rocks, and is used in dyeing purple.

Dragon's blood is the product of the large rattans of Sumatra.

Vegetable *diuretics* are squills, foxglove, dandelinn, wild carrot-seeds, parsley-root, buchu-leaves, &c.

Farina, or meal, is made from grain, and its nutriment depends on the starch which it contains.

Frankincense is the gum of the *libanus theorifera*, which grows in Arabia and India. It is also called *olibanum*.

Gall-nuts are protuberances on trees created by the puncture of insects, and gallic acid is made from those on the oak.

Gamboge is a concrete vegetable juice, and produced from two trees called *caracapulli*, which grow in Cambodja.

Gum is pure mucilage, and the juices which when matured are sweet, oily, and farinaceous, were originally mucilaginous.

Gum Arabic is obtained from a species of mimosa, called nilotica, a native of Egypt.

Gum tragacanth is a native of Crete, and more adhesive than gum arabic.

Litmus is made from the archil lichen. Acids turn its purple to red, and alkalies the red into blue.

Lichen, or liver-wort, yields mucilage, and makes a strong jelly, when boiled in water or milk.

The *Ligneous fibre* is carbnn 51.43, oxygen 42.73, and hydrogen 5.82.

Liquorice is the extract of the juice of a root cultivated at Pontefract, where it is made into pectoral cakes, and also in Spain and the Levant, and made into cakes, much used by brewers and in pharmacy.

The flashes of torches used on the stage are made by the fine dust or seeds of *lycopodium*, or club-moss.

Madder is the root of the *rubia tinctorum*, which grows in Europe. It gives a deep red dye, susceptible of changes by alkalis, &c.

Manna is a natural product of the ash and larch, and it exudes from those trees in Sicily and Calabria.

Molasses is the syrup of the cane, which does not crystallise, corresponding with the water of crystallisation.

Mum is a German liquor made from malt.

Myrrh is a gum-resin, brought from the Levant and India.

The *narcotic* principle in the white poppy produces opium, which is its concrete milky juice.

The *nux vomica*, or poison-nut, imported in large quantities (as well as opium and coccolus indicus) for brewers, is grown on the coast of Coromandel.

Opium is the hardened juice of the white poppy, and is an article used in Mahomedan countries as a substitute for prohibited wine and spirits, and in England by public brewers to give an intoxicating character to their deleterious compounds. The consumption, in consequence, is enormous, from 50 to 60,000 lbs. being consumed in this country per annum. Its price is about 15 or 16s. per lb. Superior opium is also grown in England.

The average crop of an *orange-tree* is from 6 to 8000. 90,000 boxes are imported per annum.

Otto of roses is the oil which swims at top in the distillation of rose-water.

Orris, or iris root, is imported from the Levant.

Pitch is inspissated tar, drawn chiefly from pines, and from ruins of their ancient forests, in the coal distilled from gas.

Plants are *poisonous* when the fruit is a berry, the flower a single petal, and when the fructification consists of five stamens and one pistillum.

The all-spice or *pimento* is 30 feet high, and eight or nine inches in diameter.

Pyroligneous acid or condensed steam of green wood baked in an oven is the most powerful antiseptic known; and the smoke of wood fires and charcoal act on the same principle.

Quercitron is the inner bark of the Quercus Niger or Oak, and it produces yellow dye. Oak saw-dust produces drabs and shades of brown. Oak-apples are a substitute for galls.

Raisins are perfectly ripe grapes, dried in the sun, or in ovens.

Rhatany-root is used as a tonic, and also as tooth-powder.

Terra japonica is the produce of the mimosa catechu.

The disease in *rye*, called spur or ergot, affords a black powder, useful in quickening parturition.

The *sanatives* are opium, nightshade, lettuces, poppy heads, colchicum, henbane, hemlock, stramonium, and tobacco.

The *stimulants* are the aromatics, mustard-seed, euphorbium, and foxglove for the kidneys, and ergot of rye for the uterus.

Sarsaparilla is the root of a Peruvian plant called *smilax*.

Sassafras is the wood of a tree of the laurel kind.

Salop is made from the root of the orchis, or fool-stone, a favourite food in eastern countries.

Turners make bowls from *sycamore* wood. Aother species is used for hop-poles. And 25 gallons of the sap of the sugar maple yields 5 lbs of sugar.

Soy is made from the beans of the *dolichos soja*, a native of Japan, pickled and fermented with salt.

The *yam* of the Indians is the *arum cupanolatum*, the roots of which are 5 or 6 lbs.

Storax is a fine-flavoured *gum* used in honey-water, &c.; *gum* Benjamin is another gum, labdanum another.

Tapioca is the powder of the *jatropha manihot*. The expressed juice is poison, but the fibres and seed make casava bread and tapioca.

Turmeric is the root of the *curcuma longa*. Paper stained with it is rendered brown by alkalies.

THE MINERAL KINGDOM.

The external shell or crust of the earth consists of atoms combined by the action of air, water, heat, and weight. Sometimes in grains pressed into masses, at other times of grains cemented by the exudation and filtration of the finely divided atoms of superior strata, and sometimes of masses crystallized by evaporation and often of ores which heat and melt into metals. We find besides, to a certain depth, the remains of the ancient productions and inhabitants of the earth and seas, and the most indubitable evidence of gradual formation and impenetrable antiquity.

This very interesting and useful study divides itself into earthy, or rocky formations, stones and gems, metals, fossil remains of vegetable, fishes, and animals, and mountains, rivers, and other phenomena.

Werner divides the primitive rocks as under:—

1. Granite.
2. Gneiss.
3. Mica slate.
4. Clay slate.
5. Primitive lime-stone.
6. Primitive trap.
7. Serpentine.
8. Porphyry.
9. Transition Sienite.
10. Topaz rock.
11. Quartz rock.
12. Primitive flinty slate.
13. Primitive gypsum.
14. White stone.
15. Clay porphyry.
16. Pearl stone do.
17. Obsidian do.
18. Transition Sienite.
19. Pitch stone.

The transition rocks are—

1. Transition lime-stone.
2. Transition trap.
3. Gneiss-wacke.
4. Flinty slate.

Werner teaches that the constituent materials of the primitive rocks formed originally a chemical compost, which deposited the primitive crystallized rocks in a solid state, previous to the formation of vegetables or animals. In the strata which lie on these, their fragments with shells, &c. are found: and these he calls the transition rocks. On these lie the floetz, or secondary rocks. Older and other systems than Werner's had not the advantage of his experience and general science.

Rocks consist of substances differently put together; as by chemical crystallization considered as natural formation, and therefore primitive, as quartz, felspar, mica, and hornblende, which make up granite, gneiss, sienite, serpentine, porphyry, &c. of eight kinds. The rest are mechanical deposits, formed by the action or solution of water; then there are a class of rocks made up of both these deposits and called transition rocks, which contain the earliest simple petrifactions. The rocks entirely mechanical consist of sand-stones, lime-stones, gypsum, chalk, iron-stone, &c. and are called secondary.

Werner thinks the quantity of water on the earth was once greater than at present. He infers, that transition and secondary rocks are newer than primitive, because the latter basset or appear at the surface only in elevated spots, and the others successively in lower situations. The primitive are chemical formations of silica, alumina, and magnesia, and are of 19 kinds. The transition are of four or five kinds and partly chemical, partly mechani-

cal, with petrifactions of Zoophites. In the secondary above these, he enumerates twelve kinds, abounding in vegetable and animal petrefactions. The upper strata formed by water from the rains, and abradings of these, are called alluvial.

The Neptunian or Wernerian theory teaches that all the terrestrial formations arise from water; while the Plutonic theory ascribes the whole to fire. Perhaps both may be partly true; water as a constant, and fire as an occasional cause. But if combustion is the sole cause of water, then the Plutonists claim priority.

Mineralogical maps have been contrived by Humboldt; in which limestone is represented by straight lines, salt by straight declining lines, porphyry by waved lines, and granite by irregular points.

Rocks, &c. are divided into 6 classes:

I.—Primary Rocks.

1. Granite. 2. Gneiss, or slaty granite. 3. Micaceous schist, or mica-slate.

Subordinate Rocks, such as occur imbedded in the above.

1. Crystalline limestone, or statuary marble. 2. Serpentine. 3. Hornblende rock.

II.—Transition Rocks.

1. Slate. 2. Flinty slate, sometimes porphyritic. 3. Grey wacke. 4. Subcrystalline limestone, or common marble.

Subordinate.

1. Gypsum. 2. Imbedded trap.

III.—Superincumbent Rocks of Basaltic Conformation, or Basaltic Rocks.

1. Trap, or basalt. 2. Porphyry. 3. Sienite.

IV.—Secondary Stratified Rocks.

1. Siliceous sandstone. 2. Argillaceous sandstone. 3. Calcareous sandstone and earthy limestone. 4. Chalk.

Subordinate Beds or Strata, in Secondary Rocks.

1. Trap. 2. Gypsum. 3. Rock-salt. 4. Iron-stone. 5. Coal.

V.—Alluvial.

1. Clay. 2. Sand. 3. Gravel. 4. Calcareous tufa. In this class occur beds of peat and wood-coal.

VI.—Volcanic.

1. Lava. 2. Pumice. 3. Obsedian. 4. Tufa and Volcanic Breccias.

Granite lies under all other rocks; and when it forms high mountains, the other rocks and strata are piled against it, so that it is constantly the undermost.

Immediately above granite lies gneiss, or granite in strata; then mica slate, and above that clay-state; and mingled with these last is primary lime-stone, trap, and serpentine. These primary rocks consist of crystals.

Secondary rocks, consisting of grey-wacke and sand-stone, appear to be depositions, and lie more horizontally; and in mountains of primary formation they terminate at lower levels. Gneiss itself is considered as debris of granite, which has settled on the granite, and the slates upon it, and less inclined.

The newer secondary rocks lying more horizontally on the older, are at lower levels; so that the older rocks basset, or display their edges higher and higher on the sides of a granite mountain.

Rounded pebbles are broken fragments of rocks, rendered smooth by mutual attritions, in long time, by water and tides.

The *elementary* substances which compose the varieties of stones or rocks are few, consisting only of the four earths, SILEX, CLAY, LIME, MAGNESIA, with OXIDE of IRON, CARBON, and SULPHUR. These are the solid substances of the mineral kingdom, and the first-mentioned compose above *nineteen* parts in *twenty* of the external parts of our planet.

Countries formed of secondary rocks are generally capable of cultivation over the whose surface. These include 1. Siliceous sandstone, or gritstone. 2. Argillaceous sandstone. 3. Earthy limestone. 4. Calcareous sandstone. 5. Chalk; which contain beds of gypsum, rock-salt, ironstone, coal, and trap, or basalt.

By slight variations in the quantities of these ingredients, or by the union of two or more of limestone, quartz, feldspar, mica, talc, and hornblende, all rocks, simple or compound, may be composed; and whoever has observed their gradations into each other, will be more inclined to contract than to extend their variety.—*Bakewell.*

The PRIMARY and TRANSITION rocks contain few saline or inflammable fossils; but are the repositories of metallic ores, not often found in the third division, called *secondary stratified* rocks, in many of which numerous remains of vegetables and animals occur.

The SECONDARY ROCKS consist only in part of crystalline matter, and contain fragments of other rocks or strata in layers, parallel, or nearly parallel, to the horizon, and also abound in the remains of vegetables and marine animals; and sometimes contain the remains of land animals. This division contains saud-stone, coal, stratified lime-stone, chalk, &c. Pebbles and water-worn fragments of rocks belonging to the former divisions, are commonly found in many of the secondary

rocks; hence it is inferred, that they have been formed at a later period, and hence this class receives its name.

There are in minerals eight shades of white, nine of grey, six of black, five of blue, twelve of green and yellow, fifteen of red, and eight of brown; besides clear, dark, light, or pale of those shades.

Minerals are compact solids, friable or crumbly; or fluid, as mercury or rock oil or tar. Their qualities are—1, Hardness; 2, Tenacity; 3, Frangibility; 4, Flexibility; 5, Adhesion; 6, Unctuosity; 7, Coldness; and, 8, Density.

A *simple* rock is one unmixed homogeneous substance, whatever be its constituent elementary parts; as lime-stone, roof-slate, and serpentine. But *compound* ROCKS are composed of different mineral substances, either *cemented* by another mineral substance, as sandstones and pudding-stones; or *aggregated*, which implies an intimate union of the parts without a cement; as in granite.

The *fractured* surface of fragments, broken from *simple rocks*, displays the internal structure of the parts called the *stony structure*. *Compact*, without any distinguishable parts or divisions;—or *Earthy*, comprised of minute parts resembling dried earth. *Granular*, composed of grains. *Fibrous*, composed of long and minute fibres. *Radiated*, when the fibres are broader and flattish, and so large as to be distinctly visible. *Lamellar* or *foliated*, composed of thin smooth plates laid over each other. *Porous*, penetrated by pores. *Cellular* or *vesicular*, when the pores have rounded cavities, like bladders, as in some lavas. *Slaty*, composed of thin leaves, or laminæ.

The structure of *compound rocks* may also be *slaty*,—or, *Granitic*, composed of grains, or crystals, closely united without a cement. *Porphyritic*, consisting of a compact ground, with distinct crystals imbedded, some much larger than others. *Amygdaloidal*, composed of a compact ground, with cavities, filled with another mineral substance.

The *external* structure of rocks, considered as mountain masses, is as distinct from the internal as that of a building from that of the bricks or stones. This external structure, as forming mountain masses, may be—*Stratified*, or stratiform, composed of strata. *Tabular*, or in large plates. *Columnar*, or polygonal. *Globular*, or in spherical masses. *Indeterminate*, which includes all unstratified rocks without determinate shape.

A regular mineral is *cleavable*, and the surfaces are faces of cleavage which may be single, double, treble, or four-fold.

A *simple mineral substance*, pure gold for instance, is an unorganized body, presenting an assemblage of smaller portions, all of the same nature. A *compound mineral body* is simply aggregated, as gold in lime-stone; or chemically combined, as silver united with sulphur. Some of the earths and metals, and the two alkalies, are found naturally combined with various acids; others are found combined with oxygen, thence termed oxides of those metals.

All mineral productions, as to their substance, are comprehended in four classes; viz. the EARTHY, or the stones; the SALINE, or the salts; the INFLAMMABLE, as sulphurs, &c.; and the metals, or METALLIC ores.

The first class, or *earthy* minerals, include eight genera; as diamond, zircon, flint, clay, talc, calc, barytes, and strontian. Of flint there are thirty-four species, of clay thirty-two, and of calc twenty.

The second class, or *saline* minerals, consist of only one genus, with ten or twelve species, as natron, nitre, rock-salt, alum, &c.

The third, or *inflammable* class, includes five genera, as sulphur, bitumens, graphite, charcoal, and resin.

The fourth, or *metallic* class, includes twenty-one genera, as platina, gold, mercury, silver, copper, iron, lead, tin, bismuth, zinc, antimony, cobalt, nickel, manganese, molybdena, arsenic, &c.&c. Of copper ores there are seventeen species, of iron fourteen, and lead ten.

The substances which compose granite, are felspar, quartz, and mica. The quartz is grey, and generally transparent, forming the grains of sand. Felspar is of vitrified character, but of different colours, and when broken down, forms the basis of clay. Mica is a dark grey, often decomposed by the atmosphere, and when worn down, it mixes with the clay of the felspar and thes and of the quartz. Various proportions and circumstances render them the bases of the secondary rocks which appear to be their ruins, and to fill up large original hollows, valleys, or cavities in them.

Quartz is a sparkling stone, very abundant, from the common pebble to mountain veins and entire rocks. Its crystals, when pure, are rock crystal; purple-coloured are called amethysts, and yellow, topazes.

There are five species of quartz: amethyst, rock crystal, milk quartz, common quartz, and praise.

Felspar is composed of lamina of plates. Its constituents are silex and alumina, with some potash. It abounds

in granite, gneiss, sienite, and porphyry.

When large crystals of felspar appear in granites, they are called porphyritic. In Cornish granites, the felspar is white. In the Scotch reddish brown.

Felspar, next to quartz, is the most abundant stone; being a constituent of granite and other rocks. It scratches glass, and gives out sparks with steel; but is inferior to quartz in hardness. It is the petuntse of the Chinese, and the vitrifying ingredient of their porcelain.

Mica and talc are prisms with rhomboidal bases, with obtuse angles of 120°. Felspar is an oblique quadrangular prism, with a parallellogram.

Mica is found in such large plates, in many mountains, as to be used as a substitute for glass, being semi-transparent, tough, flexible, and elastic. In Siberia, some specimens are 2½ yards square, and sold in India, and used as glass.

Silica, the substance of sand, sandstone, flint, granite, quartz, &c. has a specific gravity of 2.66. It has been imagined to consist of oxygen and a metallic base.

Sienite is a middle rock between granite and porphyry, composed of felspar and hornblende, or quartz and black mica.

Porphyry is stone with a compact base, intermixed with crystals. The base is of the trap kind, and the crystals felspar or quartz.

Curved gneiss proves that it once was fluid. It is in slaty layers or plates, formed of felspar, quartz, and mica, separated by thin layers of mica, and it contains in its veins all the metals.

Serpentine is so called from its variegated colours, generally green. It consists of 32 silica, 37½ magnesia, ½ alumina, 10½ lime, with iron and carbonic acid 15.

Magnesian limestone effervesces little in acids, and it renders dilute nitric acid milky. It contains about 20 magnesia, 30 lime, 48 carbonic acid, and one of clay and oxide of iron.

Below granite, in strata, lies mica-slate, and above that clay-slate; and mingled with these last is primary limestone, trap, and serpentine. These primary rocks consist of crystals.

Hornblende is 42 silica, 30 oxide of iron, 12 clay, 11 lime.

Augite is 54 silica, 22 lime, 12 magnesia, and 10 oxide of iron.

Quartz, feldspar, mica in grains or imperfect crystals are granite, and in scales are gneiss.

Mica-slate is mingled with quartz in masses, clay-slate has quartz in layers.

Sienite, porphyry, horneblende-slate, greenstone and basalt are composed of hornblende, augite, and feldspar, in various forms and proportions.

Beneath the surface they may perhaps exist as pure silicon, aluminum, calcium, magneseum, potassium and iron.

The schistose strata are inclined from 52 to 70 degrees in most mountains. Gneiss follows the sinuosities of the granite.

Granite is most abundant and mica-slate next, but granite does not rise above 6 or 7000 feet.

Gneiss and mica-slate are schistose rocks in parallel planes, the mica-slate generally uppermost. The Himmalayas are chiefly gneiss, and the Andes, Alps, Pyranees, Urals, &c.; so are the highest northern lands. Granite, sienite, porphyry, &c. rises through these planes, and gneiss and mica-slate abut obliquely against the protrusions.

Mica is 43 silica, 22 oxide of iron, 11.5 clay, 10 potash, and 9 magnesia.

Felspar is 60 silica, 22 clay, and 14 potash.

As feldspar decomposes in granite, pare marble or limestone is more durable for monuments.—*Clark.*

Quartz is silica.

Clay-slate is 49 silica, 23 clay, 11 oxide of iron, and 5 potash.

Potassium is the basis of potash, or the vegetable alkali. To form it, place a thin piece of the alkali between two discs of platina, connected with the extremities of a voltaic apparatus of 200 double plates. It will soon undergo fusion, and oxygen will appear at the positive pole; and, at the negative surface, small metallic globules will appear, consisting of potassium. It speedily re-combines with the oxygen of the atmosphere, and forms an oxide.

Soda is found in mineral seams, also in beds near Alexandria. The manufacturing chemists make it from common salt.

Secondary rocks, consisting of grey-wacke and sand-stone, appear to be depositions, and lie more horizontally; and in mountains of primary formation they terminate at lower levels. Gneiss itself is considered as debris of granite, which has settled on the granite, and the slates upon it, and less inclined.

The *newer* secondary rocks lying more horizontally on the older, are at lower levels; so that the older rocks *basset*, or display their edges higher and higher on the sides of a granite mountain.

Lime is not believed to be a mere animal product, but a combination of

primary substance with animal secretions.

Magnesia is obtained from magnesian lime-stone with the bittern of salt manufactories. The muriatic acid of the salt unites with the lime, and affords the magnesia. Exposed to the air it absorbs, in time, carbonic acid; becoming lime again, and unfit for medicine. It has been found pure in New Jersey.

Lime-stone, marble, and chalk, by burning, form lime, which does not unite with alkalies, or oxygen, and only with sulphur and phosphorus among combustibles, and their and other acids. In becoming mild, it renders insoluble matter soluble, and hence its use as a manure under due caution.

The smell in lime-slacking arises from the ascent of part of the lime, with the aqueous vapour.

In 3½ years mortar regains its definite proportion as carbonate of lime, or 63 per cent. from the carbonic acid gas in the atmosphere.

One bushel of coals makes four or five of lime, and magnesian lime-stone less; while this last loses half its weight.

Pudding stone is rounded pebbles embedded in cement, capable of being fashioned and polished.

Stalactitæ, or stalactites, are crystalline spar, which oozes from the earth over the tops of caverns, like icicles, often reaching the bottom, and forming solid sparry columns; and proving how similar oozings cement all lower strata by the gradual precipitation of cement from upper strata.

Stalagmites are calcareous exudations and precipitations.

Limestone caverns, &c. arise from water charged with carbonic acid.

Portland stone is coarse grit, cemented with earthy spar.

Potter's clay is 43½ silica, 33 alumina, 3½ lime, 18 water, and 1 oxide of iron.

Calcareous spar is crystallized carbonate of lime, one of whose purest varieties is Iceland spar.

Iceland spar, the substance which produces double images, consists of 56 lime and 44 carbonic acid, with a specific gravity 2.714. The faces are parallel, and inclined 105° 5', but even and polished, splitting always on the face. From this cause it produces a double image, a direct one, and another which is the result of all the reflections from all the surfaces, which being regular, produce a definite effect. The same property is possessed by all transparent bodies, made up of little regular cubes, and the extraordinary ray is a result of the regular reflections at a definite angle from all the surfaces. In glass, water, &c. there is no such set of surfaces; and the light is, therefore, diffused through the mass, producing no regular secondary ray, only a general luminosity.

An extensive formation of basalt exists nearly in the same line of longitude, from the Canary and Madeira islands to Ireland, Scotland, the Hebrides, and Iceland. Few countries in the world present such magnificent basaltic rocks as the north part of Ireland, and some of the Hebrides: probably these are connected under the ocean, and have had the same origin. The Giant's Causeway constitutes a small part of a vast basaltic range in the county of Antrim, along the north coast of Ireland. The promontory of Fairhead, and Borge, in the same range, are situated eight miles distant; these consist of various ranges of pillars and horizontal strata, rising from the sea to the height of 500 feet; from their abruptness, very conspicuous, and forming a pile of natural architecture, with the regularity and symmetry of art united to the wild grandeur and magnificence of nature. Many of the columns in the ranges of Fairhead are 150 feet high, and five feet broad. The bases along the shores are a wild waste of rocky fragments, which have fallen from the cliffs. Immense masses that have withstood the force of the shock lie in groups, resembling the ruins of enormous castles. At the Giant's Causeway the columns seldom exceed one foot in breadth, and thirty feet in height: they are sharply defined, and are divided into small blocks, or prisms, a foot or more in length, fitted into each other, like a ball and socket. The basalt is close grained, but the upper joint is cellular. The columns are mostly formed with five or six sides; but some have seven or eight, and others only three. In some situations over and also under the columns, are beds of basalt, not columnar. The basalt is cellular, and its cavities contain zeolites. The columns at Fairhead are not articulated like those at the Giant's Causeway; but the blocks, which are of great length in each column, lie flat on each other. Basalt appears to extend on the coast and inland about 40 miles in length and 20 in breadth.

The cave of Staffa is made by the destruction of basaltic pillars by the sea. It is nearly 400 feet long, and 30 or 40 broad.

Alabaster is gypsum, or calcareous, or common and oriental. Montamia is the best.

Emery is a mineral, containing 86 alumina, 3 silica, and 4 iron.

There are two substances called marle, one earthy and the other a stra-

tum, bnt not hard. The earthy is used as manure, as well as the other found in beds, in lime-stone, and coal formations.

Earth is eaten as bread ip several parts of the world. Near Moscow, a hill furnishes earth of this description, which will ferment, when mixed with flour; in Louisiana, the Indians eat a white earth with salt; and the Indians nn the Oronooko eat a certaln nnctious earth in like manner.

The Rock Bridge nf Virginia has a span of 80 feet, and is 210 feet high to the stream below. Virginia has another less perfect, 340 feet high. At Icononza, in the Andes, is another of 313 feet.

The western side of England consists of red-sand stone, covered by mountain limestone; and travelling eastward, we meet with croppings of coal-measures, magnesia, limestone, red marle, lias, oolite, limestone, clay, sand, lime, marle, green sand, chalk, sand, clay, and Londnn blue clay, in the preceding succession, and dipping down to the eastward from the surface.

The order of superposition is generally in England as follows:—Magnesian limestone and red marle; lias; inferior oolite; great oolite; cornbrash and forest marble; Oxford or ciunch clay; coral rag; Kimmeridge clay; Portland limestone; iron sand; blue marle; chalk marle and green sand; lower and npper chalks; plaster, clay, and sand; Londnn clay.

The Welch mountains are trap, and limestone, and dimstnne, They were covered with forests, and burnt down by Edward I. &c.

The Grecian mountains are limestone.

There are 61 seams of coal in the cnal basin at Liege.

Barium, witherite, or carbonate of baryta, is a mineral found in Cumberland, Yorkshire, and other parts. By dissolving it in a dilnte solution of nitric acid, evaporating the solutinn to dryness, and heating the salt obtained to whiteness, a light fawn-colonred powder results, which is baryta or barium combined with oxygen. To obtain barium, by electricity, a quantity is made into a paste with water, and placed on a platina plate; a cavity is made in the paste for a globule of mercury; the mercury is rendered negative, and the platina positive, by the poles of a voltaic battery of about 100 double plates.

Strontium, calcicnm, magnesinm, &c. are obtained by similar process.

Borax is purified tincal, fonnd in lakes in Thibet, &c.

Pits of fuller's earth are found in Bedfordshire. There lie nver the stratum several strata of red sand, six yards thick; then a stratnm nf sand-stone seven or eight yards; then other sands; then the fuller's earth. Below it is white free-stone, and below that sand again.

Amber is a mineral substance, white or yellow. Its oil is used in *eau de luce*. When rubbed, it becomes negatively electrical, like sealing-wax. It is a vegetable gum; but some have considered it as honey converted into bitumen. Some pieces contain insects and leaves, of unknown species, of the age of organic remains. From 150 to 200 tons of amber are found annually in the sand of the shore between Pillau and Polungen. It is also found there in beds of pit-coal.

Tabasheer is a transparent fluid in the joints of the bamboo. It thickens till it is converted into a white solid, and is composed of silica. Humboldt discovered it in the bamboos of South America; and a solid pebble of it is so hard as to cut glass.

Tabriz marble is semi-transparent, and is the modern production of ponds which stagnate and concrete. The process may be seen in all stages, and the whole seems like freezing and frozen water. The bubbles of its springs also concrete in hemispheres. It is veined of green, red, and copper-colour, and takes a good polish.—*Morier*.

Salt in Cheshire is produced from salt-pits and chiefly from salt-springs. The district is in the line which joins the Severn, the Dee, and the Mersey, and doubtless once consisted nf lakes flooded at every tide, which, drying at certain seasons and at low tides, deposited beds nf salt from Droitwich in Worcestershire, through Nantwich, Middlewich, and Northwich to the Mersey; brine springs flowing over beds of salt, or rock-salt, being found at different places in the entire line.

Rock-salt is found in Cheshire at the depth of from 28 to 50 yards, and the beds are from 1 yard to 40 yards thick, separated by clay or slag-stones; the colour is reddish, and it is so hard as to require to be blasted with gunpowder. The largest mine is 330 feet deep and 20 feet high, supported by pillars of the salt.

The Droitwich springs contain one quarter of their weight in salt. It is said, that a stream of salt-water runs 250 feet below the surface, nver which is 140 feet of gypsum, the boring of which produces the spring.

There are extensive beds of salt at Lake Inder in Asiatic Russia, lat. 48° 30', long. 69°.

Salt-springs and others of inflammable gas are found in China in long. 101° 29', lat. 29°, near Thibet. They

bore the well through the rocks, and prepare the salt by firing the gas of others, so that one gas-fire heats 300 kettles.

Common salt is found abundantly in nature: it exists in small quantities in most waters, and in all soils. It diminishes the tendency of animal or vegetable substances to decompose. It preserves the ocean in a state fit for animal life, and is a part of the nourishment of animals.

The sea, if desiccated, would afford a bed of salt 500 feet thick, 100 for every mile.

Newcastle obtained the first charter to dig coals in 1239, and in 1281 the export was considerable. In 1825, the produce was three millions of tons, and it employed 70,000 persons, with a capital of two or three millions.

The coal-fields of England run from the Tay to Bristol, in length 300 miles, and from 20 to 120 broad. They lie in the floetz or new secondary rocks, and in the upper series or newest floetz, but chiefly in the former.

The coal strata or independent coal formation consists of sand-stone, white and grey, or reddish, slate-clay, fire-clay, iron-stone, and green-stone.

Unlike the primary and secondary rocks, they are generally horizontal or nearly so. They vary from three degrees to twelve, or from one to four feet in twenty.

At Newcastle, the bed, two yards thick, is 150 yards deep, and though there are eight beds above this, the thickest is but one foot, and the eight are but five feet. Thirty-three yards lower a bed of a yard presents itself, and fifty yards lower one of thirty-nine inches. Nine yards lower another of thirty-eight inches, and eleven yards lower, or 270 yards, a bed of two yards. Altogether there are sixteen beds in 270 yards depth, equal to eleven yards. The intervening strata are sand-stone or slate-clay, in one place but four feet, but in another 120. Hence, if coal beds are decayed forests, covered by the sea, there must have been sixteen inundations, and other beds are found lower to the depth of 1,000 yards, while Scotland presents 24 beds in 233 yards. These beds then afford evidence of 24 revolutions of the perihelion, or confer an age on the world in this coal-forming period of $24 \times 20,900$, or 501,600 years. Through the whole of the strata, animal and vegetable remains are found. In the mean time, the globe *must have been enlarged, if forests grew 1000 yards below the present level.*

In Staffordshire there are but 13 beds, but the depth is only 107 yards, and they are 23 yards of the 107. The first occurs at 16 yards, of 10 feet thickness, and 3 others of 23 feet, separated only by a few inches of bituminous stone. The lowest at 105 yards is seven feet and a half. The intervening strata are sand-stone and clay, just as in other coal-beds.

The coal-mines, which in Staffordshire have been burning for 220 years, consist of pyrites, subject to spontaneous combustion. Water will not extinguish them, because, when drawn off or absorbed, the pyrites burn more than before.

Newcastle ships three millions and a quarter tons; Sunderland two millions; Wales about half a million; Whitehaven half a million. Newcastle and Sunderland also export about 300,000 tons.

Every family in England and Wales is considered as using, on the average, eight tons of coals, which makes the annual consumption about twenty million tons.

The steam-engines and gas manufactories consume about six millions of tons more, making a total consumption of about twenty-six millions of tons.

The apprehension of failure is a delusion: some of the most extensive coal districts being little worked, owing to the impolitic Newcastle monopoly. In Yorkshire there are exhaustless beds, which are sold on the spot at 4*s.* or 5*s.* per ton.

The Netherlands are rich in coals, and vast quantities are produced in the tracts between the Low Countries and the present French frontiers.

Coal-beds become unproductive in the vicinity of porphyry or granite. Each particular stratum preserves its own parallelism, though often interrupted by dikes and slips, which are filled up with clay, sand, and rounded stones, evidently swept into them by water, and some of them contain basalt. Coal appears to have been used by the Saxons, and some believe, by the Britons. So long since as the revolution, London coosumed 300,000 chaldrons per annum—*i. e.* 400,000 tons.

Strata of coal are not continuous, but divided both horizontally and perpendicularly by dikes or chasms, by slips, hitches, and troubles, apparently produced by the drying of the strata and by the sinking of the rocks beneath.

A cubic foot of coal weighs from 75 to 80 lbs., and 27 are equal to a ton per cubic yard, or 4840 tons to an acre, of a yard thick, and in proportion.

Carburetted hydrogen explodes in coal-mines when there is one of gas to six or twelve of air, but at one to fifteen it merely lengthens the flame of a candle. Carbonic acid gas also abounds,

but lying on the ground and first extinguishing candles, it is seldom fatal.

Seventy species of coal are brought to the London market, of which forty-five are from Newcastle.

Pittsburgh has beds of coal six feet thick; and hence is the Birmingham of the United States. The same beds extend unequally over a vast extent. Wheeling, lower down, on the Ohio, is rivalling Pittsburgh, and has the advantage of the great road from Cumberland, which is now carried to the Mississippi, in lat. 41.50.

At Barbadoes, asphaltum dug in the island is used instead of coal. In Trinidad there is a pitch-lake on a cape. It is three miles round, and of uncertain depth. It lies in furrows or chasms, constantly changing, but is so hard as to require to be broken with an axe. The district near consists of cinders and burnt earth, and for a large extent appears to be of volcanic origin. By analysis, the asphaltum appears to consist of stone saturated with pitch. It is very inflammable, and is considered as a result of the changes from naphtha and petroleum, into tar and pitch, by successive decompositions.

The pitch springs of Zante, still in work, were described by Herodotus 400 B. C.

Naphtha is purer and lighter than the petroleum of coal, of which it seems to be a native species.

Knox distilled 34 varieties of stone, and in nearly the whole found more or less of bitumen. It appeared in all the floetz trap and in the old rocks, as mica-slate, but it is greater in the recent formations.

Blasting is used for the hardest limestones, green stone, basalt, sienite, gneiss, and granite; and from 8 lbs. to 21 lbs. of powder is employed for every cubic foot above it, according to the density of the rock.

Crystals and Precious Stones.

When fluids evaporate and become solid, or when they freeze, they generally solidify in regular figures called Crystals, sometimes cubes, or four-sided, six-sided, eight-sided, or twelve-sided figures, terminated by ends always regular. The separation and analysis of these figures reduces them to primitive forms.

1. The parallelopiped, with six parallel sides, of which there are forty species of minerals.

2. The octahedron consists of two four-sided pyramids, joined at the base, and contains thirty species of minerals.

3. The tetrahedron consists of four equal triangles, and belongs to only two minerals, ores of copper.

There are from 12 to 1500 different crystals; and one observer has described 642 crystals of carbonate of lime.

The crystals of congealing water shoot at an angle of 120°. When solutions freeze it is the water in them that freezes, and the foreign substance is entangled or sometimes separated.

When water solidifies into ice, its crystals cross each other at angles of 60°, and enlarge the bulk nearly an eighth, with such force as to explode rocks, trees, and even pieces of artillery.

Nature and art present Crystals, both regular and irregular. To procure regular and well-formed crystals, by art, *time*, *space*, and *repose* are required. *Time* dissipates the abundant fluid, and brings the integral parts nearer to each other. *Space* is necessary, to avoid restraining the operations of nature. *A state of repose* is necessary, to obtain regular forms; without this, the crystallization will be confused and indeterminate; air also is necessary.

Sal ammoniac takes the form of octahedrons and cubes; and fluor spar of cubes. The diamond is often in the octahedron form, but it varies.

To dispose a substance to crystallization, it is necessary to reduce it into the most complete state of division; which may be effected by solution, or by an operation purely mechanical.

Solution may be effected by water, as with salts; or by fire, as with metals: the solution is complete only when a degree of heat is applied sufficiently intense to convert them into gas.

Some crystallized salts contain above half their weight of water, yet are dry to the touch.

Some crystals are rhombs or rhomboids, because they are solids whose faces have those figures, and are rhomboidal solids. Others are described by the number of their sides or faces. Those with four faces are called tetrahedrons; with six, a hexahedron; with eight, an octohedron; with twelve, a dodecahedron; with twenty, an icosahedron; and one having many sides, is a polyhedron. A cube is a hexahedron.

Rochelle salt crystallizes in large regular eight-sided prisms.

Gold, silver, copper-pyrites, and salt, crystallize as cubes.

Calcareous spar (angle 105°,) quartz, emerald, and tourmalin crystallize as parallelopipeds, with rhomboidal sides, *i. e.* with unequal angles.

Diamond, the magnet, antimony, and bismuth have the regular octahedron, and from calomile and topaz the same form with right angle bases.

Sulphur and carbonate of soda the same in two pyramids with rhomboid base. Emerald and cinnabar have six-sided prisms.

Haüy, in his theory of crystallization, conceives that all the forms may be produced by atomic molecules of three species. The tetrahedon, the triangular prism, and the parallelopiped, of four, five, and six sides: and Wollaston conceives that even these figures may be formed by piling spherical atoms, which he considers the fundamental form.

The six-sided prism consists of six equal right-angled sides with a six-sided base: seven species of mineral are of this form.

The dodecahedron, of which there are two figures, one the rhomboid and the other the triangle. Two minerals have rhomboid sides, one of which is garnet, and only two the other.

Gold and silver crystallize in four-sided pyramids: copper the same: tin in rhomboidal prisms: lead in four-sided pyramids: zinc the same: bismuth in four-sided parallelopipeds: antimony in oblong perpendiculars: arsenic in tetrahedrons.

In crystallizing, fluor spar and common salt make cubes. Nitre a six-sided prism, and sulphate of magnesia a four-sided prism.

The *diana arbor* is a tree-like crystallization of silver and mercury in nitrous acid.

Common salt dissolved in viscid liquids crystallizes like the leaves and branches of fir.

Calcareous spar crystallizes only in rhombohedrons, fluor spar in cubes, and quartz in six-sided pyramids.

Chemical similarities lead to crystalline similarities, as in the salts of the phosphoric and arsenic, acids. Soda, &c. is said to be isomorphous.

The sulphates of zinc and copper, copper and nickel, &c. &c. are all like green vitriol.—*Mitscherlick.*

Goniometers are delicate instruments for measuring the angles of crystals, and a very accurate one has been invented by Dr. Brewster.

The emerald is now found only in Peru. The Oriental emerald is a green sapphire.

The beryl is a variety of the emerald, of a paler green or blue. The emerald of Brazil is a tourmaline.

Corundum is a stone found in India and China, which, in crystals, is a six-sided prism, and called adamantine spar.

The amethyst, ruby, sapphire, and topaz, are varieties of this spar, differing chiefly in colour. The amethyst is reddish violet; the ruby red; the sapphire blue; and the topaz yellow:—termed oriental gems.

The tourmaline is hard enough to scratch glass, and becomes electric by heat. It is transparent when viewed across the thickness of its crystal, but opaque when turned in the opposite direction.

Apophyllite, or fish-eye-stone, has a pearly lustre, like moonstone, and its crystals are various.

Leucocyolite is a name given to a variety of apophyllite.

Cairngorm is a species of quartz.

Agates are aggregates of different species, as quartz, flint, amethyst, &c. differing in colour and transparency, but sliding into one another by imperceptible gradations. Mocho stones containing little sleps of moss, and variegated Scotch pebbles, are agates.

Glauberite is a crystallized salt, composed of nearly equal parts of sulphate of lime and sulphate of soda, without water. It is found among the rock-salt of South America.

Analcime, or cubizite, is found in grouped crystals, deposited by water in the fissures of hard lavas. It melts under the blowpipe into semi-transparent glass.

Zircone is a hard transparent stone, susceptible of a fine polish, and has a double refraction. It has two varieties, hyacinth and jargon; the former yellowish-red, and the latter without colour.

Emeralds are green, and prismatic or rhomboidal. The beryl is an inferior species. The prismatic is one-third silica, and one-fifth alumina; and the latter, or best, two-thirds silica to one-sixth alumina.

The oriental garnet is red, and the common garnet brown or green, of the size of a pea or larger. They are found in primitive rocks.

The hardness of precious stones is in the following order; Diamond, ruby, sapphire, topaz, hyacinth, emerald, garnet, amethyst, agate, turquoise, and opal.

Mount Zabarah, near the Red Sea, is an emerald mine with very extensive excavations, lately discovered by Cailliaud. Other emerald quarries exist in the same vicinity, and the district is filled with valuable rocks of primitive formation. There is also a Greek city in ruins.

In Bundelcund there are diamond mines, in a range of hills near Pannah. One of them produced the largest known diamond, and they are still moderately productive. They are six or seven hundred miles from Calcutta.

The two largest diamonds in Europe are that belonging to the Emperor of

Russia, which weighs 195 carats, or 1¼ oz. troy; 90,000*l.* was given for it, and an annuity to the merchant of 4000*l.* per annum. The other is the Pitt diamond, which weighs but 136 carats, for which, in 1720, 100,000*l.* was paid by the court of France. Diamonds are imitated by combining one half red or white lead with silex, potash, and some borax or arsenic.

Near Linken, in a cave, rock crystals have been found which weigh 4, 5, and 800 cwt. The exudation which forms crystals is a very extensive mode of rock formation in all varieties.

METALS.

METALLIC MINERALS comprehend all bodies, composed either entirely, or the most considerable part, of metals.

The *genera* of minerals are divided into *species*, and again into *sub-species* and *varieties*, according as they agree, or differ, in external qualities, shape, colour, fracture, hardness, &c.

Metals are considered as undecomposible substances, yet those that are inflammable must evidently contain hydrogen. They are twenty-three in number.

Platina, and the recently known metals, palladium, rhodium, osmium, and iridium, have only been discovered in the sands of rivers.

Gold and Silver are found in primary and transition rocks, porphyry and sienite, and the lowest sandstone. Gold has been occasionally discovered in coals, and abundantly in the sands of rivers.

Mercury is found in slate, limestone, and coal-strata.

Copper in primary and transition rocks, sienite, and occasionally sandstone, coal-strata, and alluvial ground. In North America are found, on the surface, masses of native copper, of many thousand pounds weight.

Iron in every kind of rock.

Tin in granite, gneis, mica-slate, and slate.

Lead and *Zinc* in primary and transition rocks, except trap and serpentine; in porphyry, sienite, the lowest sandstone, and occasionally in coal strata.

In what manner metallic veins were filled with ore, the opinions of geologists differ. Dr. Hutton supposes, that both dykes and veins were filled with their contents in a state of fusion, by injection from below, the expansive force of the melted matter having cracked the surface, and opened a passage for its reception. Werner supposes all veins and dykes first produced by the materials which compose mountains shrinking; and that metallic veins have been filled from above, by the ores, in a state of solution. But as it is a universal fact, that metals are found only in veins between different species of older rocks, and as different bodies possess various powers of conducting heat, which is the principle of galvanic action, and as the air in the veins supplies the elements of electrical action, the Editor has suggested that metals are generated in veins in long time by silent galvanic action. This would carry to the surfaces the oxygen and hydrogen principles, and, by their mutual action, gradually separate the fine particles of the rocks, producing threads and ore depending on the nature of the rocks. The production would be as the excitement; but as metallic rocks are probably 50 or 100 thousand years old, small increments per annum would account for the growth of all metals.

The substance forming the outer coat of the vein is also often intermixed, or forms layers alternating with the ore; this is called the *matrix*, gangue, or vein-stone.

Sometimes the ore extends in a compact mass from one side of the vein to the other. Metallic veins often divide and unite again, and sometimes separate into smaller branches, called strings.

Veins, in hard granite, seldom afford useful metal; but in those of soft granite and gneis, are found tin, copper, and lead. Copper and iron are only found in those in serpentine. Lead, tin, copper, iron, and other metals are found in the veins of chlorite schist. Grauwacke, in large masses, with few fragments, is often metalliferous, holding the precious metals, iron, lead, and antimony; and sometimes veins or masses of stonecoal, or coal free from bitumen. Limestone is the most metalliferous of the secondary rocks, and lead and copper are the metals usually found. Where veins in rocks are exposed to the atmosphere, their superficial appearance often indicates the metals they contain. When a vein has fluor spar, there is strong reason to suspect that it is associated with metallic substances. A brown powder at the surface of a vein always indicates iron, and often tin; a pale yellow powder, lead; and a green colour in a vein denotes the presence of copper.

When the dislocations or fractures of strata are filled with stones or earth, and the separations are wide, they are called *faults* or *dykes*; and when filled with metallic ores they are called veins. In these last are found the ores of metals, separated from the rocks by gypseous spar, quartz, clay, or earth,

called the matrix or rider of the ore. When the veins are not filled up with matrix, the ores are crystallized round the cavity. The ore also contains sulphur, arsenic, and earthy substances, besides different metals, which are separated by washing, roasting, reducing, assaying, &c.

Ores are of 4 kinds; 1, mineralized with sulphur or sulphurets; 2, mineralized with arsenic; 3, mineralized with sulphur and arsenic; 4, mineralized with saline substances. They are not always found where formed, but often transported in masses and fragments indicating the age of Geological changes.

Metals are always found as alloys, sulphurets, oxides, or salts. Gold, platinum, and columbium, are found only as alloys. Silver, mercury, copper, iron, antimony, arsenic, and cobalt, in the four states. Lead and zinc in the three last. Others various, in two or three states; and tungsten, uranium, titanium, chromium, and tantalium, only as oxides.

Metals have five degrees of lustre—splendent, shining, glistening, glimmering, dull.

Gold is yellow, copper red, iron grey, lead blue, and cobalt and manganese grey; all the rest are white.

Iron, manganese, tungsten, and palladium, are the hardest of the metals; the next in hardness platinum and nickel; the next are copper and silver; and the next cobalt, antimony, zinc, tin, and gold.

In the earliest ages no metals were used but those found pure, as gold, silver, and copper. The smelting of ores was a comparatively late invention, and ascribed both to observations on volcanoes and to the burning of forests.

Lodes and mines are by many supposed to have been passes of streams of water choaked up; and in most mines such streams still remain. In Cornwall they run from east to west; but in other countries they often run from north to south. The tests of a probable mine are mineral waters; trees or grass discoloured, metallic ore or sand, and the products of boring.

The obtaining of gold in mining countries costs about fifteen times as much as silver; and this cost affects the future price in the market in that proportion.

Gold is too soft to be used pure, and to harden it it is alloyed with copper or silver. In its pure state, gold bullion is considered as twenty-four carats, and then it is sold by the number of carats of pure gold, and gold of twenty-two carats is that used in our coin; two parts of which is copper. Gold plate is about eighteen carats, or one-fourth copper.

The hundred-thousandth part of a grain of gold may be seen by the naked eye, and a cube of gold, whose side is but the hundredth of an inch, has 2433 million of visible parts. A cylinder of silver, covered with gold leaf, may be drawn out 850 miles long, and yet the gold will cover it.

Gold leaf can be reduced to the 300 thousandth part of an inch, and gilding to the ten-millionth. Silver leaf to the 170 thousandth. The specific gravities are 193 to 105.—*Kelly's Cambist.*

Lace gilding is the millionth of an inch thick: gold leaf the 200 thousandth. Platina wire may be the 30,000th of an inch. 500 inches of gold wire has been drawn from a grain. Tin-foil is the one-thousandth of an inch; that is, 200 gold-leaves are only equal in thickness to one of tin foil.

One grain of gold will cover 7½ inches each way, or 52 square inches, or be 1500 times thinner than writing paper, *i. e.* a sheet of writing paper would be 1500 leaves.

A mass of 25 lbs. of pure gold has been found in Siberia.

Silver leaf breaks at the 160,000th part of an inch, or three times the thickness of a gold leaf. It tarnishes from sulphur, and dissolves in sulphuric and nitric acid.

Silver can be beat into plates, of which 110,000 make an inch, and drawn into wire, of which the thirteenth of an inch will sustain 137 lbs.

The weight of an ingot of silver is from 50 to 60 lbs. and the weight of an ingot of gold is 15 lbs. troy.

The quicksilver mines of Carniola are the most productive in Europe, and have been explored 900 feet deep. The mercury is found in clay-stones, and it often issues from the rocks spontaneously. The mines yield 12,000 quintals or 1200 tons weight per annum, and yield a million of florins to the imperial revenue. They yield also half as much native cinnabar. Till within fifty years, all the steel used in English manufactures was made in Carniola, from the iron with which it also abounds.

A cubic inch of Mercury at 62° .30′, weighs 3425.35 grains.

The platinum of commerce is found in the Spanish mines in South America in grains, and appears to be a compound of eight several metals: as palladium, rhodinm, iridium, osmium, &c. A platinum wire of the thirteenth of an inch will suspend 274 lbs.

COPPER wire, the thirteenth of an inch, will sustain 302 lbs. Copper pyrites is a native sulpheret of copper.

Silver coin contains one thirteenth of copper.

The great Swedish copper mine at Fahlnn yields from the ore but one and a half per cent. and has the appearance, says Thomson, of iron pyrites. It is a vast open cone. It has been worked for 5 or 600 years, and when most productive yielded 8 million lbs.

Parys mountain, in Anglesea, has yielded from 40 to 800,000 tons of ore annually, of which 25 per cent. was sulphur, and from 25 to 1½ per cent. copper. In the stratum over the ore is sulphate of lead, which yields 40 per cent. of lead and 57 ounces of silver for every ton of lead. There are two mines, the Mona and Parys.

Cornwall is the most productive and celebrated of the mining districts of Great Britain. The mines run from St. Austle westerly to St. Agnes, by Redruth to St. Ive's Bay, and on the surface it is a dreary district. The county also abounds in granite, with various proportions of felspar, quartz, and mica. The mines are tin, copper, and lead; and in strata of schistus and granite. The tin is calciform and glass-like, the matrix argil or silex; and the world has been supplied with this metal from hence since the days of the Phœnicians. Copper, now so important a product, was not produced here till the Revolution. The ancient workings of tin on the east coast are exhausted; and the present prnduce is 25,000 blocks worth 10*l.* or 12*l.* each. Tin ore is the heaviest, but easily melted. The Huelnr mine is 840 feet deep and spreads 1½ miles, employing 1300 people. All the mines employ sixty steam-engines, some 1000-horse power; and their average duty is 34.85 millions of pounds one foot high, per bushel. The Poldice mine yields a thousand blocks; but as copper follows the tin, many of them now are copper mines, from ore of pyrites and sulphur, all among granite, and inclined from 60° to 76°. The entire produce is about 4700 tons, worth now but 7*l.* nr 8*l.* Crennis, Huel, Alfred, and St. George's, are the most productive at present. Near Helstone there are two lead mines, and at Endillion one of antimony. Gold and silver are also found, as well as bismuth, asbestos, and lapis calaminaris. The Tintagel slate pit is 300 yards long, 100 broad, and 80 deep. Moor-stone, or granite, slates, and china-stone, or steatites, for fine pottery, are also sources of wealth, and the whole employ from 12 to 15,000 people nf all ages.

In the county, there are fifty copper mines, thirty tin mines, twenty copper and tin, five silver and lead, three cobalt and antimony, and two of manganese. Tin and copper exist in veins and fissures called lodes, one side granite and the other clay, in lines from east to west, occasionally in layers. Tin is cast into blocks from 3 to 4 cwt.; and then assayed at Cornwall, Lestwythiel, Truro, Helston, or Penzance. The produce per annum is about 25,000 blocks, averaging 3 cwt.

The works of Dolcooth mine stretch upwards of a mile from east to west, penetrated by innumerable shafts. Its depth is one thousand two hundred feet. Five large engines are employed in bringing up ore and rubbish, and three in freeing the mine from its water. —The persons employed, men, women, and children, amount to 1600. Its produce is from 60 to 70 tons of copper per month, and about thirty pounds worth of tin.

The Stannaries are the tin and copper mines of Cornwall.

A tin wire the thirteenth of an inch sustains but 34.7 lbs.

Malacca rivals Cornwall in its tin mines. In this conntry of tin, Cornwall producing from three to 4000 tons per annnm, no less than 770 tons of banca tin were imported in 1831, from Singapore, &c.; and it appears to be largely nsed by the Dutch, Chinese, &c.

The Ecton copper mine, in Staffordshire, is now working at the depth of 472 yards, being the deepest mine in England. The deepest mine worked in Europe, or in any part of the world, is at Truttenburg, in Bohemia, and it is 1000 yards below the surface.

10,000 tons of fine copper are produced per annum in Cornwall, and 2000 in Wales. No imported copper is used at home; nearly 8000 tons of British are exported. The value is about 90*l.* per ton. The ores average from eight to ten per cent.

The lead mines in Derbyshire, Cumberland, &c. yield about 15,000 tons per annum.

A lead wire, the thirteenth of an inch, sustains 28 lbs.

Galena is the native sulphuret of lead, and often contains antimony, silver, and zinc.

The ores of lead are snlphuric, and this is expelled by the heat of a reverberatory furnace.

Putty is oxide of lead, or whitening and sweet oil.

Zinc wire sustains 110 lbs., and if heated above 212 degrees, it may be rolled very thin, and drawn into wire. At a red heat it inflames, and disperses in flakes. It amalgamates with most of the metals, making a sort of paste.

Manganese has so great an aptitude to combine with nxygen, that, on being exposed to the air, it absorbs so much

as to fall into powder. If thrown into water it decomposes, the water becomes green, and is found to have absorbed 0.15 of oxygen. If this be exposed to the air it turns brown, and is found to contain one-fourth oxygen. In a native state, the oxide contains four-tenths. From this cause the native black oxide is used to obtain oxygen gas, which may be expelled by heat. The red oxide of iron contains 0.41 of oxygen; arsenic acid one half; and red chromium double.

Selenium is a new metal obtained by Berzelius from the pyrites of Fahlun. Its specific gravity is 4.32, and it is a deep brown.

Cadmium is another metal in union with zinc, with a specific gravity of 8.604, and of a grey colour.

Wodanium is grey and 11.47.

Gun metal is 12 lbs. of tin and 100 of copper.

Bath metal is 2 lbs. of brass, and nine ounces of zinc.

Iron, as well as glass, was accidentally discovered by a fire made of iron stone in one instance; and of lumps of natron and silicious matter in the case of glass. The Greeks ascribe the discovery of iron to the Cretans, and referred glass to the Phœnicians; but Moses relates that iron was wrought by Tubal-Cain, Noah's brother.

Iron stone is known to practical men by its weight and other characteristics. But no iron is visible in the fracture. It is as easy to believe that it is then formed from primitive atoms, as that it is an oxyde of what never existed in a native state to be oxydized.

The air oxydates iron in the red or yellow powder called rust.

Iron burns brilliantly in oxygen gas.

The black oxyde of iron contains 79 iron and 21 oxygen.

The red oxyde, or peroxyde, is obtained by putting red-hot iron filings in an open vessel, and agitating them till they produce the common red paint.—It is this oxyde which produces the red colour of bricks and clays, and it is 69 iron and 31 oxygen.

Carburet of iron or iron and carbon is black lead, or 19 parts of carbon and one of iron.

Phosphuret of iron is called syderum.

The ores of iron, or iron stone, are considered as mixture of clay with oxyde of iron. To procure pig-iron from these stones, they are mixed with charcoal and lime in a large furnace, and the oxygen combines with the charcoal, and the clay with the lime, by which the grains of iron are separated and melted, so as to run out in a fluid state at the bottom of the furnace. It is white, grey, or black, and when cool has a density of 7.5.

This cast iron is then converted into bar or wrought iron by being melted in charcoal and ashes with scoria of iron, and by repeated forging it becomes malleable.

Bar iron is then converted into *steel* by being *stewed* while red hot with charcoal from three to seven days. It is then cast in ingots, and its specific gravity becomes 7.8, and in chemical language it is subcarburet of iron.

Cast iron is a supercarburet of iron: and wrought or soft iron is the simple metal divested of foreign materials.

These several conversions employ sixty-nine thousand men in the largest and most imposing manufactories. The mines which afford iron stone employ great numbers. It is then roasted or burnt. Afterwards exposed to great heat in immense furnaces excited by vast bellows wronght by steam-engines. The casting is into pigs nr ingots, or utensils of all kinds. The puddling, forging, and tilting, call for machinery of gigantic size. Then follows the steel conversion, and finally the cutler.

The best steel used in British manufactures is made from Swedish iron, of which there is used about 15,000 tons annually.

One of the principal establishments in England for converting Swedish iron into steel is that of Nayler and Sanderson of Sheffield. They make most of the fine steel which is made into cutlery in that town, at the celebrated manufactories of Rodgers, Picksley, Crawshaw, Champion, and others.

Iron furnaces, among the Romans, were unprovided with bellows, but were placed on eminences with the grate in the direction of prevailing winds. Blasting bellows are now the most colnssal structures in the entire range of manufactories, some of them being of such sizes as to be wrought by a steam-engine of eighty-horse power, and their roar on entering the fire may often be heard for miles. The object of all such contrivances is to keep up a supply of oxygen gas, which being fixed by the hydrogen evolved by the fuel, its motion is transferred to the ore which is to be swelled and deoxydated, while the lime which is mixed with the ore melts and combines with the argillacious substance in which the iron is embedded. In the largest class of blasting bellows the blowing cylinder is eight feet in diameter, and it discharges twenty-four cylinders per minute, or nearly 12,000 cubic feet of air with the force nf 3 lbs. to the square inch; but, in general, one engine operates on different furnaces with 3 or

4000 cubic feet of air per minute. A single furnace thus smelts from forty to fifty tons of pig-iron daily. The old method was by water machines called Trompes.

Alloys of iron with silver are a 500th silver, and with platinum a 100th platinum.

Puddling is converting cast iron into bar iron, by separating the carbonic oxide, which rises and forms slag.

Iron is fibrous. Gold is crystalline.

The black stain, when acid is put on iron, arises from carbon.

The ore called hematites produces the purest iron by intense ignition with charcoal.

In twenty-four years the imports of bar iron have varied from 32,000 tons in 1806, to 15,000 in 1828, while the re-exports in 1806 were 5000 tons, and in 1828, 3000 tons. The market prices were in 1806 from 15*l.* 10*s.* to 18*l.* 10*s.* —and in 1828, 13*l.* 10*s.* to 18*l.* 10*s.* The duty is 30*s.*, or from Canada, 20*s.*

In 1740, the quantity produced in the United Kingdom was but 17,000 tons from fifty-nine furnaces, but in 1828 the furnaces had increased to 278, and the produce to 735,000 tons of pig-iron, which yielded two-thirds of wrought iron, or about 545,000 tons; of which 150,000 were exported in bars, hardware, and arms. 50,000 tons of old iron were also manufactured.

Of the quantity of iron, South Wales produces 279½ thousand tons, Staffordshire 219½, Shropshire 81¼, Scotland 37¾, Yorkshire 33, Derbyshire 22½, and North Wales 25. The quantity increased 100,000 tons per annum.

But 50,000 tons were exported in 1814, at a declared value of 1,143,357*l.* and 100,000 tons in 1828, at a declared value of *only* 1,226,820*l.*

In 1740, according to Marshall, the pig iron was but 17,000 tons; in 1788, it was 68,000; in 1796, 125,000; and in 1828, five times more.

The United States in 1828 took 4822 tons of cutlery, being above half our exports.

Colnbrook dale is a winding glen between two hills, about eight miles long and two broad. It supplies iron ore, coal, and lime, to some of the largest melting and casting establishments in the kingdom. Iron-stone china is also made here, and the district has been for many years a seat of astonishing production.

The steel and iron factories at *Pittsburgh* consume 11,000 tons per annum: 3,500 in castings and 7500 in rolling. 18 tons of nails are made daily, and there are seven steam-engine factories. The iron is made at Juniata.

All the iron smelted from ore in England, and used or exported, is equal to a cube of forty-six yards; and all the materials extracted to make it and the iron would make a solid of 162 yards, or the 1500th of a cubic mile, consequently irnn miners would be 1500 years in disemboweling a cubic mile of iron stone, lime, and coal, taking the whole as forty times the bulk of the produced iron.

Dannemora is the largest iron mine in Sweden, and Fahlun is the greatest copper mine in that kingdom of rich mines. The ore forms a large vein in a hill, thirty miles from Upsal. It is wrought to a considerable depth by blasting, and the ore affords 50 per cent. of cast-iron. This is the iron which is converted into steel at Sheffield, and known by its mark of three balls. Its superiority in England is ascribed to its being smelted with wood instead of coke.

Magnetic pyrites is a sulphuret of iron, 63 iron and 37 sulphur, and called loadstone. Super-sulphuret of iron is the common iron pyrites, 47 iron and 53 sulphur.

Black lead, or plumbago, contains 9 parts carbon, 1 iron.

Mercury is found native, or combined with sulphur called cinnabar. Calomel is 389 mercury, 67 chlorine; corrosive sublimate is 380 mercury and 134 chlorine.

Mines in Chili are worked by a proprietor, and one who finds capital called the habilitador. The latter, like villainous mortgagees in England, usually get all the profits, and leave the hopeless proprietor to starve.— *R. Williams.*

The mines of Mexico in 1809 yielded 28 millions of dollars, but they have since been on the decline; though in all respects in position, climate, and produce, Mexico is the most promising tract on the globe.

South America, per Humboldt, yields per annum 43,500,000 dollars worth of silver. One mine is the third of a mile deep and 8 miles in length, employing 3000 miserable beings.

The produce of the North Mexican mines have fallen off one-half during the political struggles. There were nearly five millions of dollars per annum, and latterly only two and a half.

Georgia, the Carolinas, and Virginia have gold mines which in 1830 produced 466,000 dollars' worth of half and quarter eagles, the whole gold coinage being in that year 643,105 dollars worth. The silver 2¼ millions and copper 17,115 dollars.

The Mexican ores yield four oz. of silver per cwt. Those of Saxony 10 oz.

The Mexican mines are deeper, but the veins thicker and more extensive. The mines are a lottery, but Count Regla derived for many years a million per annum from them; and Count Valenciana a quarter of a million, and the Marquis del Apartado got 800,000*l.* in six months, from a mine.

GOLD forms 3 oxides, 2 chlorides, and 1 sulphuret.

SILVER forms 1 oxide, 1 chloride, 1 iodide, 1 cyanurit, and 1 sulphuret.

IRON forms 3 oxides—blue, red, and black, 2 chlorides, 4 iodide, 2 sulphurets, 1 phosphuret, 2 carburets, as cast-iron and steel.

COPPER 2 oxides, 2 chlorides, 2 sulphurets.

LEAD has 3 oxides, 1 chloride, 1 iodide, and 1 sulphuret.

MERCURY has 2 oxides, 2 chlorides, 2 iodides, 1 cyanuret, and 2 sulphurets.

TIN has 2 oxides, 2 chlorides, and 1 sulphuret.

All in various definite proportinns, and sn with the less important and the chemical and factitious metals.

Fusibility and oxidation of metals is increased by being allnyed.

Looking-glasses are silvered with sn amalgam of mercury and tin; and glass globes with an amalgam of lead, tin, bismuth, and mercury.

Brass is gilt with an amalgam of 1 gold and 8 mercury.

An alloy of 10 copper and 1 arsenic resembles silver.

An alloy of 1 platinum and 10 arsenic is fusible at a red heat.

Tin and lead is the solder of the glaziers. It fnses at 360°.

Tin and lead; or tin, copper, antimony, and bismuth are pewter.

Three tin, 5 lead, and 8 bismuth fuse below 212°.

Iron-wire the 140th of an inch diameter bears 5 cwt., copper 3, silver and gold $1\frac{1}{2}$, zinc 1, and tin and lead but $\frac{1}{2}$. Hence iron is 20 times the strength of lead and tin.

Bronze is 1 tin and 10 copper.

Bell-metal 4 zinc, 1 tin.

Brass is 4 eopper, 1 zinc.

Dntch gold 5 copper, 3 zinc.

Wootz is steel and silicum.

500 steel, 1 silver, harder than wootz.

100 steel, 1 platinum, is like wootz.

Sodium is procured like potassium, by the electrical or chemical decomposition of the mineral alkali, or the alkali from the ashes of marine plants, instead of pearl-ash. It resembles potassium; it is as white as silver, and has great lustre. It is a conductor of electricity; fuses at 200° Fahrenheit, rises in vapour at a strong red heat; and its specific gravity is between nine and ten.

Soda, the oxide of sodium, is the chief ingredient in glass and hard soaps. Glass is soda united to earths and oxides. Soaps are soda united to oils.

The importance of metals renders Metallurgy a very important practical art, and in mining districts every thing gives way to this business. Ancient laws and severe customs govern every thing, and perhaps some of the laws of Minor, fabled to be made for hell, still prevail in Cornwall and Derbyshire. The examination of an ore is called the Docinastic Art. The pieces are cleared from foreign and stony substances. The pure mineral is pounded, and then torrefied or roasted in a shallow vessel, and the sulphur and arsenic dissipated. A certain weight of the roasted ore is then placed with fluxes in a crucible. The black flux for lead; copper and antimony are two parts of tartar and one of nitre, melted together. The flux of scopoli, for iron, is two parts of calcined borax, one of nitre, one of the ore itself, and a fifth of slaked lime. The vitreous flux for the same is eight of pounded glass, one of borax, and half of powdered charcoal.

When the mine yields native metal, or its oxide, no further process beyond that of picking and fusing is necessary; but when it is combined with sulphur and arsenic, the ore must be cleared of the stony matter or matrix. This is effected by a stamping-mill, consisting of pestels of wood, shod with iron, and armed with cocks, and which are raised by the turning axis of a wheel. Water passes during this pulverization, and carries off the light and waste parts, and what remains is called *sclich*. This is afterwards worked with brooms and water, and the sclich in being roasted is deprived of its mineralizer. It is then melted in strong furnaces, excited by blasting bellows, or sometimes by a well-known machine called a trompe, made of a hollow tree, and a cask into which water falls, carrying a current of air to the month of the furnace. But, in England, bellows worked by steam-engines now supercede this primitive contrivance.

Marshall, in 1831, calculated the persons engaged in mining concerns in Great Britain at 600,000, or 120,000 families, being an increase of 10,000 families in 10 years. Of these, coal in the north would employ 180,000, coal and iron 280,000, and 140,000 would be employed on copper, tin, lead, slate, stone, &c.

For other details, relative to metals, &c. see CHEMISTRY.

GEOLOGY.

MOUNTAINS.

However the earth was formed, whether its first form was, or was not conetary, in which it had been exposed to great heat near the sun, its solid mass cooled in an unequal form, presenting elevations as buttresses of land, and great basins as depositories of water. The rotation would, however, determine an axis in the centre of all its masses, and water, by its mobility, would accommodate itself around the centre of gyration. Since that time, the rotation and the action of the elements have constantly tended to reduce the inequalities, and they may have done so in generating and expanding the plains, but still enough of mountain remains, to confer variety and grandeur on the surface to the bipeds who have taste to admire the sublimities of nature.

Nevertheless, it has been justly remarked, that the mountains subtract no more from the rotundity of the earth than the spiculæ on the coat of an orange. We have no ridge above three miles, and only three or four mountains four miles. The first is $\frac{7900}{3}$ = the 2633d, and the second $\frac{7900}{4}$ = the 1075th. Now an orange $2\frac{1}{2}$ inches in diameter, has spiculæ the 100th of an inch, which are the 250th, or ten times greater, in comparison than our ridges of mountains.

The old continent may be considered as having for its nucleus, or rest, an immense chain of mountains, which stretches 8000 miles from east to west, under various names. In Europe it bears the name of Pyrenees, Alps, &c. and in Asia, Caucasus, Himalaya, and Thibet, and Tartary, till it reaches the Pacific Ocean. Atlas is part of this ridge; and Etna and the Greek mountains are branches of the general chain. The heights are various; or in Europe, from 5 to 15,000 feet, and in Asia from 10 to 28,000. This ridge then determines the general form of the continent, and the course of the rivers. Some call it the spine of Europe and Asia; while the Andes, in America, are called the backbone of that continent.

The countries to the north and south are governed in their elevation by their connection with this great chain; some are its valleys, and others are table lands or steppes, all sustaining different levels from the sea. Italy is merely the declivities of the Apennines, and Barbary of the Atlas chain. Bohemia is a circular valley, and Hungary another. Asia Minor is an elevated plateau; Persia is also a high plateau depressed in the middle; Thibet is a vast plateau, more extensive and more elevated, sustained on one side by the Himalayas, and on the north by the Altai mountains, both 20,000 feet high, while the immense plateau is 9000 feet. The tract northward of the mountain chain is a vast plain, which includes England, France, Holland, Germany, and Russia to the Ural chain, so level that it has been said a ball with sufficient force would roll from Paris to Petersburgh; the whole is a flat between the sea and the mountain chain, descending to Holland and the shores of the Baltic. All the rivers run from the chain to the German, Baltic, or Northern Ocean; but the Danube and Wolga filling up the basin of the Black Sea; which concurs, with the Nile, to fill up the valley or great basin of the Mediterranean.

In America there is a similar mountainous ridge, of which all the habitable land is the declivity. It begins in the Rocky Mountains and the Alleganies, in lat. 45, and extends to the Straits of Magellan; but it differs from the other great chain, in being from north to south, owing to which its great rivers run from west to east, except the Mississippi, the Missouri, the Ohio, the Paraguay, and the Parana.

The greatest elevations are in the torrid zone, and are from 20 to 28,000 feet; those in the temperate zone are from 12 to 16,000; and those in the frigid, only from 5 to 6000. The elevation of perpetual snow varies with the heat of the surface. Near the equator it is 15,700 feet; within the tropics 15,000; in the temperate zone 8600; and in Norway from 4500 to 5000. Under the equator the fertile plains of Quito are 9500 feet above the level of the sea. The town of Riobamba is 10,700 feet; and the city of Mexico enjoys a fine climate at 7500 feet; while in Europe, &c. the hardiest pines grow only at that elevation; and, in the frigid zone, only at the height of 500 feet.

The Andes chain is 4600 miles long, from the Straits of Magellan to the Gulf of Darien, about 100 miles from the shore of the Pacific, and of an average height of $1\frac{1}{2}$ mile from the level of the sea. In truth, the same chain runs through Mexico, and to the Rocky Mountains of North America, and the Alleganies in New England. It is a sort of buttress, against which the whole American continent leans, and is the nucleus of its formation, by the washing of the hills, and the working of the ocean. They are chiefly composed of clay slate, on which lie limestone and iron sandstone, while the

loftiest are the newest porphyry, with little visible granite. The clay slate is supposed to be volcanic, as volcanoes are numerous, and they exude mud and clay, which in thousands of years become clay slate, and hence organic remains at heights of two miles.

Mont Blanc is the highest of the Alps. It is 15,600 feet, or three miles above the level of the sea. Snow lies constantly on its sides 12,000 of these feet. The summit is a narrow ridge, like the roof of a house; its uppermost rocks consist of strata of granite, nearly vertical. De Saussure, at the top, on the third of August, found Fahrenheit 27°, while at Geneva it was 82°; the barometer fell to 16.02, while at Geneva it was 27.2: and the air contained six times less humidity than at Geneva. Respiration was difficult and sounds very feeble; while the pulse was increased to nearly double. Many perish in attempting to descend it. To the dryness of the air Saussure ascribed his extreme thirst.

The Caucasian Mountains lie between the Euxine and the Caspian. The story of Prometheus is referred to these mountains; and probably it arose from the fires at Baku, in their vicinity. They are from 3 to 400 miles long, and about 200 broad, consisting chiefly of granite and limestone, and their tops are covered with snow and ice, the lower parts abounding in rich minerals. Elbourose, the highest, is 16,800 feet; and the people say it is the residence of the king of the hobgoblins. The valleys are exceedingly fertile, interspersed with noble forests. There are also several hot and mineral springs of remarkable character.

The Altai Mountains are 4,000 miles in length in Siberian Tartary, and often as high as the Alps.

The Dofrine mountains in Scandinavia are from 8,000 feet to 6,000, but are chiefly remarkable for the richest mines in Europe, amidst eternal snows.

The Carpathian mountains, in Hungary, are 4 or 5,000 feet high, and contain the richest known copper mines, as well as iron, lead, gold, and silver.

The Apennines are from 4000 to 6000 feet high, and covered with woods and pastures to their summits. Large tracts of the valleys are very fertile; others emit sulphurous vapours, and some have become desolate, owing to the cupidity of the great land proprietors, who in past ages demanded higher rents than the cultivators could pay.

The Peak of Teneriffe presents five zones of different vegetation. For 7 or 800 feet it produces vines, corn, olives, &c. the second zone produces myrtles and trees, the third chiefly pines, the fourth and fifth produces little vegetation and is very cold; the upper part is covered with pummice-stones and lava. In the middle is a cone, and on the top of it a crater 300 feet long and 200 broad, and of such evident antiquity, that Humboldt conceives it has not been in action for some thousand years. The whole mountain appears to be volcanic, and its recent eruptions have been made from the sides.

The highest peak of the Rocky mountains is 12,500 feet, and of James's peak is 12,000 feet. Mount Washington, in New Hampshire, is 6634 feet.

The European mountains consist of primitive and transition rocks.

Mount Carmel, so often referred to in the Jewish histories, is the highest of several mountains in its vicinity. The valley of Sharon lies to the south of it; and it forms a grand promontory in sailing along the coast. It is 2000 feet high, shaped like a flatted cone, with steep and barren sides. There is a chapel upon it, and some monks called Carmelites.

Mount Athos, in Macedonia, is above a mile high and inhabited by 5 or 6,000 Greek monks, who have twenty-four monasteries on it.

There are eight hills in Scotland nearly of the same height; Benevis and Benwyvis, 4380 feet each; Benmacdnie, 4300; Cairngorum, 4060; Benlawers, 3978; Rona, 3944; Benmore, 3903; and Benhope, 3900. Besides six others, about 3000 feet.

In Sicily it is thirty miles from the foot of Etna to the crater, and the surface of the entire mountain is 1900 square miles. The great crater is ten miles round and 400 yards high. Pindar called it the pillar of heaven, and Deucalion and Pyrrha were said to have taken refuge on it to escape the deluge. The perpendicular height is 11,000 feet, or rather above two miles.

Snowdon is but 3600 feet above the level of the sea. The promontory of Penmaenmawr, at the edge of which a road passes, is 1550 feet.

The Alps cover 600 square miles. They are divided into the Maritime, the Cottian, the Grecian, the Helvetian, the Pennine, the Rhœtian, Norican, and Julian.

At Mount Perdu, in the Pyrennees, 11,270 feet high, and the Sierra Nevada, 11,060 feet high, snow is permanent above 8900 feet.

South of the great chain of the old Continent, the deserts of Africa and Arabia, and the plains of India present themselves; and the rivers Indus, Ganges, &c. fall with the land towards the Indian and Southern Ocean.

The mean inclination of the Peak of Teneriffe is 12½° and Mont Blanc 45°.

It seems, on the evidence of Seltzan, Gray, and Ehrenberg, that a sand-hill on mount Sinai, called Nakato, by continually falling, produces remarkable tones, like an Æolian harp; and a murmuring noise, like a distant cannonade, much louder at certain times.

Isolated mountains are generally volcanoes, as Etna, Teneriffe, &c.

Granitic mountains are rugged and precipitous, gneiss less so, and slate smooth and round. The European and Asiatic mountains are crowned with granite; but the Andes are topped with whinstone, or the newest floetz trap: and granite does not rise higher than 8 or 10,000 feet. Chimborazo has porphyry at its summit, and Pichincha basalt. Limestone is also found at great elevations.

Most mountains present their precipitous faces to the sea, and their slopes to the land.

The mountains of South America unite near Panama, lower towards Mexico, and then expand into elevated table land, 6 to 9000 feet high, with volcanic mountains; and terminate at a level of 3000 feet, in the parallel of California.

The Allegany Mountains, in New Hampshire, are 8000 feet, and the range is 900 miles. They consist of granite, slate, and limestone, filled with organic remains.

On the Brocken, the highest of the Hartz Mountains, a spectre is seen, of which superstition has made a profitable use. Formerly there was a temple on it; and to this day there is the sorcerer's chair, the magic fountain, and the sorcerer's anemone. The spectre is seen in the afternoon, when the sun, at a certain height, projects the shadow of the spectator on any clouds or mists in the atmosphere. His image is thus seen several hundred feet high; and all his motions are displayed.

The Mountains of Séger, in Arabia, produce frankincense; and those of Safra, the Balm of Mecca, from the amyris opobasamum, which in very early ages sold for its weight in gold.

The Steppes, in Asia, consist of extensive tracts, nearly level, and without trees; the soil sandy, and serving the Tartars to graze their flocks and horses. Those near the Black Sea afford abundance of salt, a proof that it formerly exceeded its present size.

One of the most remarkable precipices is at Table Mountain, in South Carolina. It is 3000 feet high, and stands on the edge of a valley, which nearly doubles its perpendicular elevation. Near it is a cataract, which falls 6 or 700 feet. In the plains around, a strata of shells, beds of oyster-shells, and petrified fish are found in great abundance. There are also found enormous bones of unknown animals, the ribs of which are six feet long, the teeth above eight inches, three and a half wide, and nearly a foot in the root.

There are on mountains perpetual snow levels, at the following heights.

On the Andes, lat. 2°	14,760 feet
Mexico, lat. 19°	13,800
Teneriffe	11,454
Etna	9,000
Caucasus	9,900
Pyrennces	8,400
Alps	8,220
Iceland	2,890
Lapland	3,100

On Chimboraco, the upper 5400 feet is perpetual snow.

At 3500 metres high from the level of the sea, woody plants disappear. Then shrubs only, then plants, then a wide expanse of grasses, then mosses, lichens, &c. on porphyritic rocks, and then perpetual snow and ice.

Humboldt, from his observations on the American and European mountains published a theory of mountain production, but it is found not to accord with the Himalayas.

On the elevated plains of Quito, and others to the south, the sites of towns and extensive industry, the barometer stands constantly at 20 inches.

Cotopaxi is 140 miles from the ocean, and one of the eastern ridges with Timgnrahua and Cayambe. Chimborazo, and four other of the highest, are on the western ridge of the Andes.

The depths of fissures or crevices between the Andes, are even more astonishing than their heights. Many of them descend below the level of the sea. At Chota, there is one 5000 feet deep, and at Cutaco another 4200 feet deep.—*Humboldt.*

Gerard measured his elevation at the pass of Brooang in the Himalayas with a barometer, and found, at 15,000 feet, the blue-bell in full flower, and many other flowers of the temperate zone.

The Himalayas, or seats of snow, are the termination of the elevated plains or steppes of Tartary. Their extent, from the sources of the Ganges to those of the Bramapootra, is 1400 miles, and their descent to the sea is that of the rivers and plains of Hindostan. The mountain ridges are from 50 to 60 miles wide. They run from N. W. to S. E., between lat. 25 and 35, and extend into Persia under the name of Hindoo Coosch, and into China on the east; being the source of all the rivers of the oriental seas, and the materials of the strata of the plains.

Captain Webb, by the barometer at the Temple of Keder-nath, about lat. 30, determined the height to be 12,000

feet above the sea, or 11,897 above Calcutta: the highest ridge of Nitee Ghaut he found to be 16,814 feet; and the Temple of Milem, 11,790. These places had no snow, but were surrounded with wheat and barley, forests of oak, pine, &c. with luxuriant vegetation, whence are brought the fleeces of Cashmere. Yet, on comparison with the Andes, above 10,000 feet ought to have been perpetual congelation.

These high table lands of Thibet are deemed the cradle of the human race, from their having first escaped the floods of the seas.

The Himalayas were at first overrated, but the barometer determines Chipki to be 20,597 feet; and Trigonometry determines Purgeool to be 22,488, and Ruldung 21,103 feet.

At a village in the Himalayas, 14,700 feet high, the goats produce the fine wool for shawls. At 15,500 feet, beds of fossil shells are found. At 20,000 feet, there is no perpetual snow. They have been ascended 19,600 feet.

Sukanda, in the Himalayas, was estimated 25,500; and Dhawalagira, 27,000 feet, visible above 250 miles; and nineteen of these mountains were said to be higher than Chimborazo.

There are 120 mountains or ridges above 10,000 feet above the level of the sea, and 150 from 5000 to 10,000, many of them extensive ridges. The chief are as under, by Reddel's scale:—

Race-course, Brighton	feet 400
Monmouth hill	450
Arthur's seat	800
Dunsinnan	1030
Edgecombe	1300
Malvern	1350
Wrekin	1450
Penmaenmawr	1460
Gibraltar	1470
Pentland	1600
Three Brethren	2090
Sion	2100
Vaucluse	2150
Ingleborough	2280
Wharnside	2500
Cheviot	2670
Sinai	3000
Saddleback	3080
Schehallien, Skiddaw, and Ben Lomond	3280
Monsterrat, Athos, and Heartfell	3300
Helvellyn	3350
Snowdon, Table at Cape	3500
Stromboli	3850
Vesuvius	3900
Parnassus	3950
Ben Lawers	4030
Ben Nevis	4400
Suufriere	4830
Hecla	4900
Puy de Dome	5200
Port des François	5760
Col de Tende	6100
Stony Mountains	6450
Olympus	6500
Simplon	6600
Cenis	6800
Rouge	7600
Santa Fé	8700
Pilate	8950
St. Gothard	9080
Carnigou, Pic du Midi	9300
Parmesan	10090
Buet	10120
Pic Blanc	10400
Etna	10950
Perdu	11200
Hochhorn	11300
Egmont	11440
Atlas and New Zealand	12000
Argentiere	12180
Teneriffe	12250
St. Elias	12700
Ophir	13850
Ortel	14400
Dome de Gonté	15500
Southern Thule	15100
Rosa	15550
Pichincha	15600
Blanc	15680
Tartarian, or Altai	15800
Cotocache	16450
El Altar and Hinica	17500
Cotopaxl	18900
Disis Casada and four others	19500
Chimborazo	21000
Chipki, Himalayas	20597
Purgeool ditto	22480

VOLCANOES AND EARTHQUAKES.

Volcanoes and earthquakes are now generally agreed to be effects of the same causes, the generation of gases in deep-seated cavities of the earth, and their explosion by the internal heat arising from pressure, by the decomposition of water, and by the combination of gases, in conditions which always produce combustion and explosion. When vent is found, we have volcanoes and earthquakes; and when no vent, then extensive and destructive earthquakes. Connected with these are bitumens, hot springs, and other phenomena. Particular instances are recorded; but as the causes are always the same, the effects are merely varied by circumstances.

About 200 active volcanoes are recorded, of which 89 are in islands. Submarine volcanoes often throw up islands. The Azores, the Lipari, the Canary Islands, &c. are examples. There seems no doubt but the same species of gazeous explosions, which cause volcanic eruptions, cause earthquakes, and these always accompany the activity of volcanoes.

All volcanoes appear to exist near a sea, and, by the matter they eject, to have some communication with it.

Volcanoes and tracts of land are often absorbed by the earth, and leave lakes in their places.

Professor Daubeny ascribes earthquakes and volcanoes to the access of water to the inflammable bases of the earths and alkalies. When the explosion is single or double, and confined in a cavernous space, it is an earthquake; and when fed and supported by water, as in an elevation, it becomes a volcano.

The products, in many countries, prove that in certain states of the earth they must have been more numerous. When the fermentation is commencing, smoke appears; noises are heard; earthquakes take place; and explosions of ashes, sand, and stone, precede the flow of melted lava. The smoke consists of steam, and carbonic, sulphuric, or muriatic gas. The ashes appear to be exploded lava, and are often carried by the wind 1 or 200 miles. Thick accumulations of them form a compact stone, called tufa; the scoria is like the slag of iron furnaces. The explosive force is such as sometimes to throw stones of 1 or 200 tons eight or nine miles.

Lava is a stony substance like basalt, and may sometimes be seen at the bottom of a crater red-hot, like melted metal, bubbling as a fountain. When it overflows the crater it is very fluid. At Vesuvius, a red-hot current of it was from eight to ten yards deep, 2 or 300 yards broad, and nearly a mile long. Mount Hecla, in 1783, threw up a current of burning lava, fifty miles long and thirteen broad. In Mexico, a plain was filled up by it into a mountain 1600 feet high, by an eruption in 1759. Its heat was so great, that it continues to smoke for above twenty years afterwards; and a piece of wood took fire in lava 3½ years after it had been ejected, at a distance of 5 miles from the crater. Sometimes they throw up mud, and produce extensive devastations.

Black volcanic glass is obsidian.

Thirty one great eruptions have occurred of Etna, within the records of ancient history. Stones of immense size rise to the height of 7000 feet, and others fall 100 miles distant.

Volcanic action does not consist in the combustion of beds of coal, but in terrestrial operations seated deep under the oldest formations; and the hot-springs in Germany issue from gneiss, granite, and clay slate.

At the Lisbon earthquake, in 1755, Bristol Hot-Wells became red. A well in King's Wood became black, and the Avon flowed back while rising. It also affected wells and lakes in Scotland, and produced noises in our English mines.

In 1750, an extensive earthquake at Penco, in Chili, uplifted the whole coast fifty feet.

Humboldt, a great authority on every subject, maintains that dynamical earthquakes, and chemical volcanoes, have their causes in the interior of the earth, and act through fissures and empty veins. He ascribes the mud and fishes often distributed to snow and lakes at the sides of volcanoes, and considers the matter properly ejected, as ashes and lava only. When the summit of Canguairazo 18,000 feet high fell in, 43 square miles were covered with mud and fishes.

The eruption at St. Vincents, in 1811, was heard, he says, under countries 47,900 square miles in extent, like the discharge of artillery. In the earthquake at Lisbon, the sea in the West Indies rose 20 feet; and the Lakes of Switzerland, and Scotland, and the Baltic Sea, were also violently agitated—a radius of 4000 miles.

In 1822 and 23, Chili was visited by a continued series of earthquakes, which, on the testimony of Mrs. Graham and Lord Cochrane, raised the whole coast from three to four feet above its former level, making a new beach; and Mrs. G. asserts, that she traced other lines of beach, evidently raised by various earthquakes.

Tucuman, in different parts, is visited by dull subterranean noises, often among rocks as loud as cannon. In Lima, the same noises resemble the rattling of coach-wheels over paved roads. Lightning kills the fish of rivers, an effect ascribed also to subterraneous agitations.

Explosions, like cannon, are often heard in mountainous districts, and they appear to arise from pyritical ejections at some depth. Light spots, like flame, are also seen on the tops of mountains, which may arise from ascending phosphuretted hydrogen.

In an eruption that happened in the year 1693, the city of Catania was overturned in a moment, and 18,000 people perished in the ruins.

Fourteen earthquakes, in different parts of the globe, were recorded in 1827, and perhaps this is an average number.

In Java, there are apertures in the ground which throw up mud in spherical masses, and have changed the face of their vicinity.

The Sandwich Islands are volcanic, and Owyhee itself is the cone of a volcano higher than Mont Blanc.

There have been twenty-nine destructive earthquakes in Calabria since 1602, occasioned, as is believed, by the materials of a pent-up volcano, the vapours

of which pass through the soil in fissures, cracks, and chasms. Animals buried under the ruins in the earthquake of 1793, were taken out alive in 30 or 40 days, and human beings survived after being buried 12 or 16.

In 1687, the sea retired from the shores of Peru, and returned in mountainous waves, which destroyed every thing on the coast; among other places Callao. In 1746, the same phenomenon again took place, and only 200 out of 4000 inhabitants of Callao saved themselves,—nineteen vessels were sunk, and four, including a frigate, were carried over Callao into the country.

In the earthquakes of Calabria, gaping fissures in the ground, radiating like a broken pane of glass, were visible in some places, from 30 to 200 feet deep.

During the earthquake at Lisbon, in 1755, a new quay of marble covered with people, who fled there for safety, sunk, and not a vestige or body was ever seen again. This earthquake was supposed to arise from a volcanic region under the Atlantic.

On the 26th of March, 1812, 12,000 persons were killed by an earthquake in the city of Carraccas only.

Lyell supposes, that the Greek and Italian volcanoes are connected with those in the Azores, and hence the earthquakes in Portugal, &c.

The great Geyser rises out of a basin 56 by 46 feet over. The pipe in the centre is 78 feet by 8 or 10.

Lake Avernus used to kill birds that flew over it; Lake Quilotoa, near Quito, does so at this day, and the vapours of this and Lancerote, one of the Canaries, kill cattle also: all are on volcanic ground.

The contemporary Roman writers are silent about the destruction of Herculaneum and Pompeii; but Dion Cassius, 150 years after mentions it, and states, that giants issued from the earth, accompanied by sounds of trumpets, &c.!! Vesuvius reposed for 492 years, till 1631; and its crater, 1000 paces deep, and a mile and a half in diameter, was rich in wood, and herbage for cattle; but since then, every ten years has had its destructive eruption. It is now 800 feet lower, and its crater three quarters of a mile over, and from 1 to 2000 feet deep. The lavas are augite and feldspar, and often porphyritic, with great variety of minerals.

Pompeii was destroyed by showers of ashes, but Herculaneum by hot mud, on which six streams of lava have since accumulated. They had recently been destroyed by an earthquake, and were rebuilding. In the barracks at Pompeii were found the skeletons of two soldiers, fastened by chains; and in the vaults of a country-house were 17 persons, among which was a perfect cast of a woman, and a child in her arms; the bones, and a gold chain and rings only remaining. Fishing-nets are abundant in both cities. A loaf, and various condiments, were found, and a box of pills, &c at an apothecary's. The Papirii of Pompeii are illegible; but those at Herculaneum, though charred, may be decyphered. Other Papirii have been found at Stabiæ, but illegible. Torre del Greco was covered with a solid rock of lava in 1794. 80,000 persons still reside on the sides of Vesuvius.

140 millions of cubic yards of lava were ejected from Etna, in 1669.—*Ferrara.*

Some writers describe a volcanic band in the eastern islands, from 60 to 200 miles broad, extending in a segment of a circle, from the Northern Philippines, to Ceram and Timor, and thence through Java and Sumatra. Another such band is alleged to extend from Paros and Hydra to Santorin, in the Grecian Archipelago. And the vicinity of the Azores is supposed to be the seat of much volcanic agency; which convulses those seas, throws up islands, causes earthquakes, &c.

From April to July, 1815, Tomboro in Sumbawa, continued in violent eruption. The explosions were heard 980 and 720 miles, and only 26 of 12,000 inhabitants survived. The ashes darkened the air for 300 miles round.

In 1783, Hecla ejected two streams of lava, 40 or 50 miles long, 7 to 13 broad, and 100 to 600 feet deep, and it destroyed 9000 persons, and 20 villages.

In 1759, the mountain Jorillo, in Mexico, was thrown up from a plain 1600 feet high, and numerous cones from 3 to 600 feet, on a space of four square miles in one night.

In 1819, Jorillo threw ashes 140 miles.

The noise which immediately precedes a great earthquake is astounding. Some compare it to the loudest echoes of thunder, others to a subterranean torrent of rocks and stones, which stuns the victims, and deprives them of sense and motion.

At Turbaco, in Mexico, on an extended plain, are about 20 cones, 20 or 30 feet high, with craters filled with water, through which volumes of azote and mud explode above 100 times an hour.

Berzelius thinks, that all hot-springs pass near a centre of volcanic action, perhaps long extinguished; he also thinks that the hot-springs of Carlsbad

are as old as the rocky formations. The river Tepel flows over their lid. Two pounds of half-melted basalt raises 7 lbs. of water from 11 R. to 59 R., whence it is concluded that mountains of heated basalt may maintain the heat of hot-springs for many centuries, as at Bath, &c.

Near Baku, in Persia; in some parts of Italy; and in an island in the Levant, there are natural orifices in the earth, through which inflammable gas passes. Sometimes it takes fire by its own friction, on coming into contact with the oxygen of the atmosphere, and at other times requires to be lighted, like a gas-lamp. Similar gas constantly issues from the veins of coal-mines, and produces fatal explosions; but it might be lighted and consumed as it is generated.

Superstition always attached supernatural agency to this natural production of certain minerals. One of them, in the Levant, to this day, is called the burning bush of Moses; and at Baku, temples for fire-worship are erected over them; and one of them, the priests or devotees allege, has been burning for several thousand years, and will continue as a miracle till the end of the world. They call it the everlasting fire.

Hanway relates, that the flame makes the soil hot, without consuming it, and if made to pass through a cane, or cone of paper, does not consume them, as described by Moses, though the flame will boil a pot. The ground is dry and stony, and smells like sulphur, and if uncovered, the flame spreads to any distance. Brimstone is dug as an article of commerce, and naphtha springs arise and frequently in jets two or three feet high, which, on drying, become black, like pitch. In Persia, they burn it in their lamps, and for cooking; and in Russia use it as a medicine. Springs of hot-water likewise arise near Baku.

The same sort of combustible exhalations arise in China, and that industrious people use them for purposes of manufactory.

Between 1666 and 1669, the village of Boncourt, upon the Eure, containing 80 houses, was burnt at sundry times, by igniting exhalations like the *ignis fatuus*, of a blue colour and offensive smell. It was most frequent in August and September, and accompanied by clouds of a red colour.

Iron, in springs, binds together the sand and gravel into solid masses, and the carbonate forms chalybeate springs. Carbonic acid gas is largely disengaged from springs, and decomposes the hardest rocks, especially feldspar, and even granite.

A petroleum spring, in the Birman Empire, yields 400,000 hogsheads per annum, and there are others in Trinidad, Italy, &c.

Calcareous springs hold carbonate of lime in solution, and more when impregnated with carbonic acid, which being dissipated, the lime is precipitated as Tufa, and Travertin. At San Felippo the deposits in a pond are 30 inches per annum. The lake of Solfaterra contains more than its own volume of carbonic acid gas, and some sulphuretted hydrogen. The banks are covered with reeds, lichen, conferva, &c. and the edifices of Rome are built with travertin.

Springs are formed by the intervention of clay and sand strata, the former holding water and the latter permitting its free passage. So that in well-digging, there is no water till clay is reached, or penetrated quite through.

Thirty-eight several substances have been found in various mineral waters. The acidulous abound in carbonic acid. The chalybeate in iron. The hepatic in sulphuretted hydrogen. The saline in salts.

The mineral waters of England may be thus classed. *Alteratives*, Buxton, Matlock, Malvern. *Aperients*, Harrowgate, Cheltenham, Leamington. *Tonics*, Bath, Tunbridge, Cheltenham, Isle of Wight.

The Bath waters contain but the sixth of a grain of iron in a gallon, and some silica and azote. A gallon of Tunbridge contains 2.29 grains of oxyde of iron, 8.05 of carbonic acid; 4.75 of azote, and 5 of oxygen.

The hot-baths of Bath range from 96° to 115°; and of Buxton from 80° to 82°.

Bristol or Clifton hot-wells water is 74½ degrees, and its specific gravity 1.00077. A gallon contains 43⅜ grains of sulphate of soda, sulphate of lime, and carbonate of lime, and four grains of muriate of soda. Also 30 cubic inches of carbonic acid gas.

Buxton water is 82 degrees; and a gallon contains 11½ grains of calcareous earth, 2½ of vitriolic selenite, 2 of sea-salt, and azotic gas.

The waters of Aix-la-Chapelle contain 4.75 carbonate of lime, 5 muriate of soda, and 12 carbonate of soda. The gas is sulphuretted hydrogen.

Hot-springs, forming vast deposits of calcareous rocks, abound on the north of the Himalayas, and their deposits display the highest antiquity.

The houses which were engulfed at Port Royal, in 1692, were distinctly visible, in 1780, to persons who passed over them in boats. The Greeks used to alledge ages after, that the two cities of Bura and Helica were visible in the

sea. The Welch assert, that the sea-wall, built to protect their coast, might be seen across Cardigan Bay 1000 years after; the natives of Syria affirm, to all travellers, that Sodom and Gomorrah may still be discerned in the Dead Sea.

Arduino, in 1759, first distinguished rocks into primary, secondary, and tertiary. Pallas verified this classification in 1778, in granite, schistose, and lime-stone.

Lyell states that our carboniferous rocks are older than any other land, but that taking away the marine strata, the primary mountains only would remain. Calcareous rocks with fossils, like those in our transition and mountain lime-stone, extend over great part of Europe and North America.

It has been suggested that as the Deserts extend in a line to the Gulf of Syrtis, this gulf may have been the opening of an African sea which once covered all the deserts of that continent. Flakes of salt, sea-shells, and putrified fishes are found every where in these deserts, and the cliffs and sides of the hills are full of shells and marine remains. If it were so it was, of course, prior to the traditions of Mediterranean History, and the drainage might have accompanied the absorption of Atalantis.

Bogs in Ireland are remains of fallen forests, covered with peat and loose soil, often forming hills. The quantity of rain in Ireland has added to this feature of all countries. Moving bogs are slips of these hills carried to lower levels by accumulated water.

The sands so much encroach on the western side of the Nile, that it covers once-flourishing villages, whose spires and minarets are visible through its surface. Probably the Oasis of Ammon was once part of fertile Egypt. The deluge of sand from the African deserts seems as fatal to the ancient world as an irruption of the ocean, or the lava of a volcano, and it spreads with fatal certainty.

Sand-floods are frequent near sea-shores where the wind carries the sand on the beach, and thence over the land. In Africa, vast tracts of native sand are thus carried over adjoining districts, and have gradually encroached so as to threaten all Egypt with their sterility, having, since the Christian era, narrowed the valley of the Nile as well as the northern states of Lybia, Cyrene, &c. while the sands of Arabia have encroached on central Asia.—These sands float like waves before the wind, and at a distance resemble the surface of the sea, while tornadoes in them are fatal to travellers.

SEAS AND RIVERS.

We live upon a globe whose surface is water and land. Pride leads us to give precedency to the latter, but figures tell us that the former is as 3 to 1 or 150 to 47, and nature shows us that soil and minerals are mere vehicles to the activity and agency of water. Nor is it only in a mechanical sense that water works so many wonders; since, by weight it is formed of 8 parts of oxygen, and 1 of hydrogen; and by volume of 1 of oxygen and 2 of hydrogen; and therefore it possesses within itself high powers of chemical union, and decomposition with regard to all other bodies. Experience leads all seamen to regard water as the major, and land as the minor, for land to the eye is merely an escape from water; and mechanically it is so useful a natural tool, that it compensates for all external inequalities of action on the earth as a planet, counteracting the moon in its tides, and preserving the balance between the earth and sun, by always accompanying in masses the progression of the point of the perihelion in each hemisphere.

The surface of the sea is estimated at 150 millions of square miles, taking the whole surface of the globe at 197 millions; and its greatest depth is supposed to be equal to that of the highest mountains, or four miles; but La Place thinks that the tides demand an average depth of three miles, therefore, the sea would contain 450 millions of cubic miles.

The Pacific ocean covers 80 millions of square miles, the Atlantic 25 millions, the Indian ocean 14 millions. The Southern Ocean to 30 degrees is 25 millions. The Northern Ocean 5 millions, the Mediterranean one million, the Black Sea 170,000, the Baltic 175,000, the North Sea 160,000, the Persian Gulf is 600 miles long, and the Red Sea, without a river, is 1500 miles.

The collection of oceans mingling round the south pole are of themselves an extraordinary phenomenon. They cover a third of the surface, but bounds have been set to their encroachments by pointed capes, whose foundations are connected with the granitic base of the earth. The disposition to encroach on the land is evinced by the acute angles and mountainous character of all the promontories which present themselves to it; while, in the north, the passive character of the ocean is evinced by the obtuse forms of the coasts both of Asia and America.

The narrowest part of the Atlantic is more than two miles deep. In other parts it is about one and-a-half miles.

In general, the colour of the sea is

a bluish green, lighter on the coasts. In the Mediterranean it has a purple tint. In the gulf of Guinea it is white. Near the Maldives it is black, and in other places has red and yellow tints. Its component parts, with very slight variations, are water, muriatic acid, sulphuric acid, mineral alkali, sulphate of lime, and magnesia. The freezing point is $28\frac{1}{2}$ degrees.

Sea-water appears to contain from 3.4 to 4 per cent. of salt. Its specific gravity is 1.028. The salt lake of Ourmia has specific gravity 1.16507, and the Dead Sea 1.211.—*Marcet.*

There is a regular current from the pole towards the equator, and in low latitudes from east to west. This general current being embayed in the West Indies, begets a returning stream called the gulf stream, which proceeds between the Bahamas and Florida, northward, at the rate of three or four miles an hour; and it thence passes to Newfoundland, and is reflected eastward to the Azores, and crosses the Atlantic to the Canaries; and thence joins the general current from east to west. Humboldt calculates that the same water is nearly three years in making this circuit of 10 or 11,000 miles. A branch of it reaches the western coasts of Ireland or Scotland, and often brings West India products, wood, &c. which even reach Greenland, &c.—It may be distinguished by its higher temperature. Its breadth increases from sixty miles, at lat. 28 degrees, to 150 at 33 degrees, and at 40 degrees it is 500 miles.

An upper current runs into the Mediterranean, and a south runs into the Baltic, on the Danish side, and a north one out of it on the Swedish side.

The waters of the Red Sea appear to be thirty-two feet higher than the Mediterranean, and the Gulf of Mexico is twenty-two or twenty-three feet higher than the Pacific.

In two attempts to sound the Northern Ocean, with lines 1 mile and $1\frac{1}{2}$ miles long, no bottom could be found.

The Atlantic contains many currents often favourable to Navigation. Thus there is one on the African coast, another from Gaboon to Ascension which accelerates a ship one-fifth. Opposite Guinea there are two parallel currents running in opposite directions, with a velocity of 68 to 100 miles a day.

Springs of fresh-water arise in most seas, and some on our coasts. Near Cuba there are remarkable ones.

About thirty fresh-water springs are discovered under the sea on the south of the Persian gulf.

Tides are great only on coasts and funnel-shaped rivers. In the centres of wide seas, as the Pacific or Atlantic, the tides are trifling. The whole is like water librating in a basin.

Rivers are the channels which mountain-streams would maintain, and in every 1,000 years they would sensibly extend the land by their deposits, and raise the level of the sea on all other coasts. Physical causes, in the varied declination of the Perihelion, would at the same time, in every 20,900 years, change the whole bed of the ocean in each hemisphere, arrest the progress of the other causes, and so limit its ascendancy as to maintain the duration of the system.

Rivers are a beautiful part of the harmony of Nature. The sea rises in fresh vapours, it falls in rain, fertilizing the ground, and returns by the lowest levels to the sea again, forming a channel in the soil; and when the fall is not sufficient, lakes more or less extensive, and courses more or less devious as the land is hilly or plain.

Rivers and tides produce silent but great changes in the forms of land, and they flow in the lowest levels, but overflowing and contracting, they soon form decided channels by raising the banks with mud and vegetation. Sometimes their course is interrupted, and they form lakes which enlarge till they overflow, and hence cataracts. The St. Lawrence is an example of these circumstances.

Asia is palpably the preponderating mass. The axis of rotation equalizes the whole, or reduces various inequalities to one. The pole of the earth therefore respects Asia, and the pole of the orbit is on the contrary side as to Asia. Their distance is $23\frac{1}{2}°$, but constantly decreasing, because the Asiatic mountains are constantly spreading over the plains, and carried into the adjoining seas.

The following are the chief rivers:

The Amazons, in South America, falls from the Andes through a course of 2,600 miles.

The Mississippi, from the Stony mountains, 2,550 miles.

The Hoang, in China, from the Tartarian chain, 3,260.

The Yangtse, from the same, 3,060.

The Nile, from the Jibel Kumri mountains, 2,690.

La Plata, from the Andes, 2,215.

The Wolga, from the Valdais, 2,100.

The Euphrates, from Ararat, 2,020.

The Danube, from the Alps, 1,790.

The Indus, from the Himalayas, 1,770.

The Ganges, from the same, 1,650.

The Oronoco, from the Andes, 1,500,

The St. Lawrence, from the lakes, 1,230.

The Zaire, Niger, or Whorra, 1900.

The DON, the DNEIPER, and the SENEGAL, are each above 1,000.

The RHINE and the GAMBIA 800.

The quantity of water discharged into the sea by all the rivers in the world is about 36 cubic miles in a day, hence it would take above 30,000 years to create a circuit of the whole sea through clouds and rivers.

The mud of large rivers extends continents at their debouches; the subsiding mud forms deltas of low lands which in time unite with the main land, and form the plains. The Amazons, the Oronoco, the Mississippi, the Nile, the Danube, the Zaire, and the Ganges all have islands, at their mouths, and the sea is muddy for a great distance. The Mississippi adds 300 feet per annum to the main land from this cause; the Nile has advanced the land sixteen feet per annum since the time of Herodotus, and has raised the surface of Egypt four inches in a century. The Po carries out the land 228 feet per annum, and consequently Adrea, which 2,500 years ago was upon the sea, is now twenty miles from it. The Yellow river in China carries down two million cubic feet per hour of alluvium, so as to be likely to fill up the Yellow sea.

The Nile begins to rise in June, and attains twenty-four to twenty-eight feet of elevation in the middle of August, and then floods the valley of Egypt twelve miles wide. The Ganges rises from April till August thirty-two feet, and then creates a flood 100 miles wide. The Euphrates rises between March and June twelve feet, and covers the Babylonian plains. The Mississippi rises with the melting of the snows from March till June, and forms breadths of rapid water of vast extent. At the distance of 1,000 miles from the sea, it rises 50 feet, and by spreading over a large tract rises only 25 at 300 miles, and 12 feet at 100 miles.

The Mississippi falls in its course 1,330 feet, or 5 35 inches to the mile. Its velocity is from 1 to 5 miles per hour. From the gulf of Mexico to the Missouri is 1,220 miles, to the Ohio 970 miles, and to the Arkansus (itself 1,500 miles long) 570 miles.

The territory watered by the Mississippi is 4000 miles long, and its tributary streams is about 1,500,000 square miles.

The falls of the Missouri extends 17 miles. The greatest is 300 yards wide and 87 feet. Another is 440 yards and 50 feet. The river rises in the Rocky mountains in three springs.

The fall of the Ganges is 4 inches to the mile, and 9 inches in the mile of land; of the Amazons 4 inches and the land 6.75; and of the Nile, 6 inches, for 1000 miles.

The matter borne down by the Ganges and Burramapooter every year probably exceeds that ejected in Iceland in 1783, 4, and 5.—*Lyall.*

The Amazons fall but 16 feet in 50 miles, the Rhine one foot in quarter of mile, and the Loire a foot in $1\frac{1}{4}$ mile.

The vast tract of land between the Andes and the Atlantic is so level, that in 300 miles the river Paraguay does not fall above a foot. Three rivers fall into an estuary of fresh-water, called the Rio de la Plata; which, at its efflux, is 150 miles broad, and 30 miles over, opposite Buenos Ayres. At 200 miles distance, it receives several rivers besides the Paraguay, and this receives the Parana and Aruguay, which run to the Andes.

The country near the Oronooko and its tributary streams, is flooded in the rainy season to a vast extent; and the Oronooko, near its mouth, expands over the land in June, July, and August, 5 or 600 miles.

Anciently the Adige and Po overflowed their banks, and committed great ravages; embankments were resorted to, but the beds filling up, the banks have been so raised that the rivers now flow 50 or 60 feet above the level of the country, and are constantly rising!

The Mississippi, during the 4000 miles of its course, and augmented as it is by the Missouri, the Ohio, the Red River, the Arkansas, &c. presents surprising phenomena. It winds in regular semi-circles, and forces its line of way easterly. Trees so accumulate in it, that a raft 10 miles long, a furlong wide, and 8 feet deep, has been seen on it covered with growing bushes, flowers, &c.

Mackenzie River being closed at its outlet by frost 9 or 10 months in the year, causes great floods in the interior, and great destruction of forests, &c. so that it forms vast beds of water-loaded wood in the icy ocean, and generates the lakes of Canada.

There can be no doubt but the Dutch provinces have wholly been formed by the mud of the Rhine, the Meuse, the Scheldt, and the Weser. So the Delta in Egypt, and perhaps all Lower Egypt have been deposited in like manner.

The famous Dead Sea, in Palestine, is 72 miles long and 18 or 20 broad. Its waters are salt and acrid, so that no fish or vegetables live in it, and it petrifies substances immersed in it. The specific gravity is 1.21, being the heaviest water known; and it contains muriate of lime 4, of magnesia 10.24, of soda 10 36, and sulphate of lime .054 in 100 grains. Sulphur, coal,

bitumen, and various volcanic products are found near it. Strabo relates that thirteen cities once stood on its site, which were destroyed by a convulsion; and it is alleged, on various authorities, that ruins are still visible on the shores; and late travellers describe the whole region as volcanic. Asphaltum, or Jew's pitch, rises as a scum on its surface, and is got by Arabs on rafts, or picked up in lumps on the shore, and sold.

The Black Sea is believed formerly to have been united with the Caspian, and also to have extended its bounds to the north and west. It is also believed to have overflown, and forced the mouth of the Bosphorus, and at the same time to have caused that deluge which is recorded in all ancient history, and which obliged Deucalion to take asylum in Athens. Diodorus says that cities formerly stood on the site of the Bosphorus. Tournefort adopts the same idea. Buffon thinks that the Black Sea, the Caspian, and Aral, were once one vast lake, and when a passage was forced through the Bosphorus, the sea was diminished in size, while it enlarged the Mediterranean; and hence the traditions of a deluge in all the countries round it. Olivier, a mineralogist, describes the islands in the Bosphorus as volcanic. Bergman, who travelled last in these districts, states as an undoubted fact that these island seas were once one. Dr. Clarke adduces many striking facts in proof of the same theory, that a volcano opened a passage for the Black Sea into the Grecian Archipelago, and thereby drained the steppes which lie between the Euxine, the Caspian, and the Arral. The Black Sea is so called from its darkness and thick fogs, but Tournefort denies this and contradicts the ancients; but Dr. Clarke and the Russians agree with the ancients.

The Caspian Sea receives the waters of seven or eight rivers, some of them, as the Ural and the Wolga, very large. This circumstance has led geologists to conclude, that it must have some communication with the Euxine, or Persian Gulf. It formerly was much more extensive, as is proved by the marine remains at a distance from its present shore. The level of the Caspian is from 3 to 400 feet lower than that of the Black Sea.

Though the Caspain Sea is remote from every other, yet the water is salt, and it abounds in fish, and the usual marine productions.

Lake Baikal, in Siberia, is 300 miles long, between 51 and 55°, and, according to Pallas, abounds in geological and natural wonders. It lies in an amphitheatre of the Baikal mountains, much above the general level. The lower Angara is its outlet, and it forms cataracts a mile over. The water is fresh, yet it abounds in seals, and in many peculiarities. The scenery is sublime.

The salt lake of Aral, the Caspian, and the Baltic were once connected, and perhaps the Caspian with the Persian Gulf, forming Homer's circle of waters, and bounding the then known world. Dessication seems to be a cause always operating.

Lakes vary in size continually from dissiccation, and their extinction forms basons of organic remains.

Water presents the most remarkable phenomena in Canada. Fresh-water lakes abound everywhere, and several are of vast extent. Lake Ontario is 160 miles long, and 450 round, and several hundred fathoms deep; the soil around it being volcanic. Lake Erie is 300 miles long and 710 round, and not more than 50 fathoms deep, and abounds in water-snakes. Lake Huron is 250 miles long and 1,100 round, and is subject to violent storms. Lake Michigan, to the south, is 280 miles long, and 945 round. Lake Superior is 400 miles long, and 1,600 round. The Lake of the Woods is 75 miles long, and 200 round. Lake Winipig is 200 miles long, and 550 round. Lake Bourbon is 80 miles long, and 230 round. The Great Slave Lake is 200 miles long, and 550 round. Lake Champlain is 120 miles long, and 300 round. There are also other lakes in the cold regions, but of secondary size. The river St. Lawrence, with which most of these lakes are connected, is one of the largest in the world, being 2,500 miles long, navigable for the largest ships to Quebec, 400 miles; and for ships of 4 or 500 tons to Montreal, while fleets may sail on the lakes. The communication between these and the sea is intercepted by the great waterfall of Niagara, between Lakes Erie and Ontario, where the river is the third of a mile wide, and the fall takes place in three cataracts, made by two small islands, 150 feet; the roar of which is heard 15 miles round, while the vapour may be seen for 60 or 80 miles. There is also a fall on the Montmorenci, 200 feet in breadth, and 246 feet high; besides others which in many countries would be remarkable. The lakes contain many islands, some of them of great magnitude; and the shores of the lakes, and the cliffs around the lakes, often exhibit remains of fallen forests, 30 or 40 feet below the level of the surface of the country. The

lakes run between a calcareous stratum on the south, and a granitic on the north.

Lake Erie is rapidly filling with deposits. It is 330 feet above Lake Ontario. Before the great Fall the river falls fifty feet in half a mile. The ledge of the fall is limestone rock on shale, which last gives way, and the rock in consequence falls in masses, so that the cataract recedes four feet per annum, and in 10,000 years has fallen back from Queenstown, where the whole plain of the similar table land sinks to the lowest level.

The beautiful lake of Geneva is contracting, and the lakes in Lincolnshire and Cambridgeshire have become dry in our days. The marine palace of Canute is now near Ramsey, twenty miles from the sea. Wales was anciently separated by an arm of the sea from the Bristol Channel to the estuary of the Dee and Mersey.

Lake Superiour is from 80 to 200 fathoms deep, or, at this last, 600 feet above the level of the surface of the Atlantic. The ancient beaches are 40 or 50 feet above the present level. Several hundred streams supply the lake, far exceeding the outlet at Port Mary.

Calicut is overwhelmed by the sea, and its ruins are visible beneath it. *Forbes.*

Major Long states, on the evidence of the strata, &c. that the ocean once covered the vast plains between the Alleganies and Rocky mountains.

The sea continues to encroach on the Cornish coast. Mount's Bay and St. Ives are expected to meet, and place Penzance on an island. Scilly anciently joined the Land's End, and St. Michael's Mount has not been an island for many centuries.

The numerous islands on the coast of Norway generate currents, and one of them, called Malstroem, runs between some islands six hours from north to south, and six the contrary. Against the tide, and in stormy weather, it is fatal to navigators, and even to whales. At high and low water, and in summer, it may be crossed without danger.

The Delta of the Ganges is 200 miles long, and consists of woods called sunderbands. The tides rise from 13 to 16 feet. Islands 2½ miles in diameter are often formed and destroyed. It pours down from 80 to 400 thousand cubic feet in a second.

Rivers hold in suspension 100th of their volume (more or less,) of mud.

That singular natural curiosity, the floating island, has emerged from the bottom of Derwentwater three times in about thirty years. It contains about an acre, and is quite stationary, and is entirely unconnected with the bottom and the shore; the soil is three yards thick. This floating island is not a solitary example. There is one at Lake Gerdau, in Prussia, and another at Lake Kolk, in Osnabruck.

On low coasts, as in the Netherlands, and on the sandy mouths of rivers, the reaction of tides throws up the sand in hills or downs, often very high, and always increasing.

The Hindoos have a record translated by Wilford, describing a great churning, as they call it, of the sea, near the Hebrides, which lasted for months, and produced great changes. Perhaps it was a sub marine volcano. The Irish chronicles record the separation of the Scilly islands, and there can be no doubt but the English channel was formed, and is still widening by the tides and floods which first opened it as a marine funnel.

In a common elementary Chinese book, it is stated, that "in remote antiquity the waters rushed in—the waters flowed abundantly—the waters became at rest—the waters subsided."

In Icebergs only one-seventh is out of the water, and many are seen 200 feet high.

There is a tradition in Cornwall of the submersion of the Lionesse, a tract extending to the Scilly Islands.

St. Bride's bay was once a flourishing province of Wales called Gwaelod.

The opposite French coast suffers equally from the swell of the Atlantic, which seems to have broken between France, Ireland, and England, in very remote ages.

The Coast from the Scheldt, and to Jutland, is suffering from constant encroachments, and has been marked by great destruction of life and property, within 500 years.

The bore of the tide occurs where rivers are funnel-shaped. It is considerable in the Severn and the Dee. In the Ganges it is five feet, and in the Menan 12 feet, moving 17 miles an hour.

The difference of level between the Pacific and Atlantic at Panama and Chagres is 3½ feet more in the Pacific.

The Delta of the Rhone has extended the coast several miles since the age of the Romans. The Po, the Adige, the Piave, Brenta, &c. have expended the coasts in the north of the Adriatic from 2 to 20 miles in a length of 100. Adria, Spina, and Ravenna, once seaports, are now inland.

Betweeen Nice and Genoa, the sea is 2,000 feet deep, and near Gibraltar it is 500 feet.

Our eastern coast, from Sutherland to the Humber, is encroached upon; villages have been absorbed, and the encroachment is four yards per annum. Ravenspur, Hyde, &c. have long disappeared, and Spurnhead is in danger. At Sheringham, the encroachment is two yards per annum. Ancient Cromer is in the sea. Hills of blown sand protect other parts. Dunwich, a considerable town and port, has now but twenty houses. Aldborough is now sea, and Harwich will soon be an island. Sheppy is fast disappearing. Thanet loses a yard per annum.

The Strait of Dover, from 18 to 20 fathoms deep, is the summit of two inclined planes, extending to Ushant and the North Sea.

Rye and Winchelsea, opposite the meeting of the two tides, were destroyed by the sea within 500 years. From hence to Lyme, the coast wastes a yard per annum. The coasts of Devonshire and Cornwall are hard rocks.

The lands between the Equator, in the Northern Tropic, are to those of the Southern Tropic as 13 to 1. And the whole land in the Northern Hemisphere is, to that in the Southern, as 210 to 64, or 3.2812 to 1.

The whole earth, as 1000 parts, is 726 water and 274 land; and the water in the Southern Hemisphere is, to that in the Northern, as 436 to 290, or 1.5 to 1.

The seas in the Southern Hemisphere being to those in the Northern as 290 to 436, or as 2 to 3 exactly; whenever the 3 becomes 2 the 2 will become 3, and the seas enlarged must be half as deep again as at present. Hence, whatever we take to be the present depth of the Atlantic, when the Southern Excess is brought to increase it, it will add half to its heighth, while it will expand it to 436 instead of 290.

The *southern* hemisphere, of 500 parts, is 64 land and 436 water.

The northern hemisphere of 500 parts is 210 land and 290 water.

The excess of land in the northern over the southern, is 146 parts; and the excess of water in the southern over the northern, is also exactly 146 parts.

For $210 - 64 = 146$.
And $436 - 290 = 146$.

A very striking coincidence; and one of those *definite mechanical proportions*, in which every thing in nature abounds. The *difference* between the centrifugal force of the *land* in the northern, and the *water* in the southern hemisphere, ought, of course, to accord with the aphelion and perihelion forces; therefore, this *exact* accordance of the *quantities* of the two reacting materials in both hemispheres is a demonstrative proof of the justness of the theory which asserts their intimate connection.

The numerical law, which governs and balances the division of the land and sea, enables us to approximate the precise effect, when the perihelion is in Cancer. The Northern Seas are 290 and the Southern 436, which, surprizingly enough, is *exactly* 2 to 3. If, then, these relations are to be changed, and if 1 is taken from 3, and added to 2, the Northern Oceans, in their present bounds, would be half as deep again as at present; but if they expanded to 426, or a third more, they would be $\frac{2}{3}$ of $\frac{1}{2}$ the present depth, that is one-third. If, then, the present mean depth is 2 miles, or 10,560 feet, the sea would rise 3520 feet; and if 3 miles, 5280 feet, in either case leaving but five or six hills in Great Britain uncovered, and ascending a fifth or third up the sides of Mont Blanc.

The sea, in 100 centuries, would raise all the *diluvium* on table lands and slopes of mountains, and mingle pebbles, loam, and debris, as we find them in the diluvium which was then generated as to the sea, just as the *alluvium* is now deposited by rivers, lakes, &c. The action of the seas for 100 centuries, directed, in the end, from north to south, would of necessity produce those drifts of stones, &c. whose phenomena is so different from what would be produced by the force of a single tide.

The extra quantity of water required by the Noachian deluge would be from 6 to 700 millions of cubic miles, equal to one and a half the bulk of the present seas. In forty days, for a depth of 20,000 feet, the fall of rain would be 500 feet per day, or above 20 feet an hour, day and night. Whiston asserted that the water came from a comet's tail in its way to the sun; for, in his days, this tail was imagined to be something more solid than refracted light; and Beckhamm, a learned and pious German, calculated that the same comet, in returning, attracted it back again.

As marine remains are found above the level of the sea, many geologists oddly enough imagine the land to have been raised; but as we know a physical cause for the alternate rising and falling of the sea in each hemisphere, the rising and falling of land is an hypothesis not to be hastily adopted, except in the case of local volcanoes.

The whole atmosphere, on modern theory of height, &c. is supposed to contain only as much aqueous vapour as would make 13 6 inches of rain.

Blair tells us, that on Sunday, Dec. 7,

2347 B. C. it began to rain, rained forty days, (the Jewish indefinite) aod covered the earth 150 days. Oo May 6, the ark rested on Ararat, and on Friday, Nov. 18, 2346, Noah came forth.

When the sea returned with the perihelion, and encroached, during successive ages, on the land, cavities like the basins, caverns, and hollows, would be filled with transported bones, mud, &c. In like manner any obstruction to its tides or currents would arrest heavy bodies, aod produce such assemblages as now surprize us. A rocky cape, the slope of hills, &c. would do the saoe. An advance of 10,450 years, and a retreat of 10,450 years, would, in silent grandeur, produce all the hills, vallies, inclinations of strata, and peculiar features of the surface, and roll the stones and deposit the shells which we every where find amidst rnral cliffs, which once were covered by the ocean, or which then set bounds to it.

Coral formations occur chiefly between 30° of lat. in the Pacific; also in the Indian Ocean, the Red Sea, &c. Their increase is very slow, not above six inches in a centnry. In 32 surveyed they varied from 30 miles to 1 in diameter, and 29 still had lagoons. The thickness of the walls is from half to a quarter of a mile. The lagoons gradually diminish in breadth aod depth. Some have latterly considered them as extinct volcanoes, to which corals have attached themselves; and Mr. Lyall favours this opinion. Disappointment Islands and Duff's groupe are connected by 600 miles of coral reefs, over which the natives can travel from one to the other.

Coral reefs are believed to be of very prolonged formation. They are evidence of an antiquity of the world far exceeding all received estimate. Aqueous plants, and floats of land ores, seeds spread by birds, &c. soon cover them when above water. Beneath the water, (Flinders says,) he saw wheatsheaves, mushrooms, stags' horns, cabbage-leaves, of all vivid colours, and resembling a garden. Nor are corals the only producers of these reefs, for amoog other shelly inhabitants were eoormous cockles, from 50 to 200 lbs. weight. The rocks formed of dead corals and remains, united with gluten, are compact, dense, and in perfect cohesioo. On the east of New South Wales is one reef 500 miles long, and upwards of 200 fathoms perpendicular, forming mouotains of limestone.

Within half a mile of many coral-reefs there are no soundings to the depth of several hundred fathoms.

ORGANIC REMAINS, OR ORYCTOLOGY.

Thanks to the industry and science of modero philosophers, we now have abundant records of the past history of the world, long, very long, before the invention of letters, when chroniclers first begao to flatter the vices and crimes of kings, aod the follies and errors of nations, in what is called history. These modest tablets never lie; and, if not perverted by the craft of moao, they supply materials for exhaustless observation and contemplation. By their moeans we are enabled to trace the revolutions of orgaoic being from the granitic base even to our age, and to carry the history of the globe through numerous perihelion periods, perhaps for thousands of thousands of years.

Fracastaro was the first modern who, in the sixteenth century, insisted that fossil-shells, &c. had belonged to living animals. The gratuitous idea of a plastic imitative force had existed for ages, and continued for two other centuries. Others, even to our day, have ascribed theon to the Deluge of Noah. Dr. Plott, in 1677, ascribed them to "a plastic virtue latent in the earth."

In all countries, on digging to certain depths, and in mining, the remaios of fishes, vegetables, quadrupeds, and birds, are found in the soil or embedded in the rocks, except in those of simple snbstance and prinoitive antiquity. The general regularity with which those that are marioc are laid at one level, and those which are products of land are laid at aoother; aod the alternations of these moarine and land products lead to the cooclusion that the sea has repeatedly covered the land for long periods of time, and that the land has, at intermediate periods, been dry. The remains consist, always at certain depths, of species of animals, vegetables, &c. not now in existence, and often of genera not congeoial to the present cliomate.

Cuvier has enumerated several hundred genera of animals, fishes, and vegetables so found, of which there are none among the living genera and species.

The lowest rocks, it is therefore inferred, were at one time the surface of the earth and the seat of organic life. These appear to have been destroyed by some great revolutioos, which brought new tribes of organized beings, while their kinds prove that the surface was covered with water. The subsequent appearaoce of aomphibia, &c. prove the developement of dry land

where these appear to have been swept away. Among later solid rocks, the monstrous race of herbiferous quadrupeds and gigantic lacerta came into existence, when the earth seems to have acquired herbage for their subsistence. How long this race kept possession cannot be guessed, but their length of life is well known. The gypsum, &c. which now contains their remains is covered with newer deposits, abounding in sea-shells, and above this stratum is found a new race of herbiferous animals of the genera of the elephant, rhinoceros, &c. and above them is the first loose soil, intermixed with marine substances, proving second or third immersions of the sea; and above this lies the soil which *the present race* of animals enjoy.

The age of the rocks indicates the age of the remains, but we can measure neither by any comparison with known time.

The older secondary rocks contain peculiar aquatic plants and reeds, then above these madrepores, corals, &c. all fixed where they lived; then shellfish, very simple, but differing from all now in existence; in strata above these fishes, bamboos, and ferns; in a still higher stratum are more complicate shells and oviparous amphibia, as crocodiles, tortoises, and reptiles; these are embedded in the uppermost solid rocks of the oldest secondary formation.

In the newest solid rock formations, whales, seals, and birds, appear; above these, land animals of enormous size, birds and fresh-water shells, all in concrete rocks.

Above these, in the lowest beds of loose soil and peat bogs, elephants, elks, rhinoceroses, of peculiar species are found. Near the surface is found the remains of the existing races. Human bones have only been found among these.

Petrifactions arise from silex, in aqueous solution. The Azores, the Geysars, Lough Neagh, the Thermal springs of Ischia, are examples.

The fossil or organic remains in strata are always the same kind in similar strata, and generally have characters of simplicity of structure, proportioned to the age or depth of the stratum. According to Kirwan, petrifactions or fossil remains are found in marl, chalk, limestone, or clay; seldom in sandstone and rarely in gypsum; never in gneiss, granite, basalt, or shorle; but sometimes in pyrites and ores. They are impregnated with the species of earth in which they are formed. Those in slate or clay are compressed and flattened.

In the *oldest limestones* are found worms, tubipores, millipores, belemnites, ammonites, nautilites.

In *argillacious schists* of primary formation are found the same, and corallites, echinites, fishes, leaves, reeds, palms, &c.

In the *lowest secondary sandstone* are found the preceding with orthoceratites, and pectinites.

In the *secondary limestone* below coal are found the same with the griphites, ostracites, buccinites, &c.

The *coal* above the preceding evidently consists of bituminized timber, with leaves and shells and branches of shrubs lying upon the beds, and shells, &c. in the shale between the beds.

Red marl, or sandstone, contains all the preceding, together with crabs, and amphibia, and fishes.

The strata between the preceding and chalk contain every variety of shells and zoophytes.

Chalk abounds in fossil remains, like the preceding, with sponges, prinites, tortoises, and parts of fishes. Above the chalk the lowest marine limestone, and two other strata above it, contain similar remains, with leaves of fuci, and the sandstone above is similar.

Gypsum, the lowest fresh-water formation, contains various large animals of the genus palæothera, canis, anoplothera, saurus, &c. besides birds, fishes, and palms.

Above the *gypsum* is a marine formation of gypsum and marl, containing marine shells, crabs, and fishes.

The *upper sandstone* contains various marine shells of a dozen genera.

Above this is another *fresh water formation*, containing various animals with silicified wood, and remains of crocodiles, turtles, lobsters, sharks' teeth, and branches of trees with fruit.

Chalk also contains marine substances, from the sponge to the alligator; and Clay contains crabs and lobsters, shells, fishes, crocodiles, fruit, fossil wood, and seed vessels of woods in great varieties.

Diluvial rocks contain elephants, &c.

Below chalk the remains are marine; but chalk and the coal formation, and upwards, contain marine and land remains.

The upper old formations contain the larger animals, and the alluvial and newest strata, subjects with which we are familiar.

One hundred genera of multivalve and bivalve shells have been discovered, and of some of them there are hundreds of species. Eighty genera of bivalves are also enumerated, be-

sides thirteen genera of zoophytes. Most of the shells are of genera no longer in existence, and their forms, often gigantic, create astonishment in the most listless. Ammonites alone form some hundred species, from a diameter of four or five feet to aggregated millions of a few pounds.

Cuvier establishes thirty-six new genera of fossil quadrupeds now unknown, besides uncertain ones, and forty-nine species. He thinks the oviparous animals were more ancient than the viviparous, that they might have been contemporaneous with the more ancient fishes, but that quadrupeds and mammiferous animals were far more recent.

Several immense basins of rock have been discovered, which are now filled up and level, as the Paris basin, by Cuvier; that of the Isle of Wight, that from Sheppy to Reading, on which London stands, by Webster; and that of Sussex, by Mantell. First, there is a marine stratum in them on chalk, of sand and clay with shells; the next stratum is fresh-water deposits; the third marine, the fourth fresh-water, and then over this are alluvial deposits. The basins are 500 feet deep, and below them are limestone, marl, sandstone, chert, and shale, all containing marine shells. The lowest of the fresh-water contains palm-trees, amphibia, quadrupeds, and birds. The third contains fishes and crabs, and covers the second with marl, sandstone, and quartz, of the kind called millstone. The fourth contains fresh-water shells and vegetables. The alluvial contains various strata, and remains of elephants, trees, and many large unknown animals, and on this lies the soil of the surface.

Mount Bolca, near Verona, presents the most numerous specimens in Oryctology which have yet been found in one place. Bones of elephants, stags, bears, and phocæ, 200 genera of unknown testacea—200 species of petrified shells, belonging to different modern seas and climates, with zoophytes of different genera; and remains of birds and insects are found in immense masses; basaltic columns, scoriæ, lava, &c. appear, the whole proving that fire and water have operated in remote ages.

The remains of land animals are not more remarkable at Mount Balca than those of marine production, for the fishes of all modern seas and rivers are embedded in the calcareous quarries, a sort of marly schist of a light grey colour, affording a fœtid odour like putrefaction. In general they are perfect and not mere impressions. There have been ninety-four species found, one three feet in length, and a young shark, with its food undigested in the stomach, and another fish had one half swallowed in its throat Fish of the Japanese seas, others of rivers in India, and some peculiar to fresh-water lakes, while many of the specimens belong to genera and species no longer in existence. Marine plants are imprinted on the stones, and among the remains of birds a petrified quill has been found. To account for the varieties it has been supposed either that a volcano increased the temperature of the surrounding sea, or that the gulph of a volcano may itself communicate with the sea, and the fish be involved, for it appears that fish are frequently thrown in prodigious numbers from craters of burning volcanoes. An apothecary at Verona lately possessed a cabinet containing 600 fishes of different sizes, extracted from Bolca, and the Marquis Douisi had 800 specimens, many of extraordinary size.

Brogniart, in his Geological Flora, classes plants into four periods: 1, The transition and coal formations; 2, Variegated sandstone; 3, The chalk, and 4, Above the chalk. He conceives that the successive creations are distinguished by a sudden change in the essential characteristics. Those of the fourth period are similar to the present. Below the chalk the most perfect are the *cycadeæ* and *conifera*. A land vegetation marks each period, while one family of one period runs into another. The dicotyledonous begin in the oldest strata of the secondary formations, and increase in the more recent.

Miners are familiar with a prodigious variety of vegetables, none of them like the plants of the present country. Remains of palms and tropical plants are found in England, and all over Europe.

Forests of standing trees have been discovered in Yorkshire and in Ireland, imbedded in stone.

Shells, bones, teeth, and various vegetables are scarcely altered. In other cases their impressions remain on the stones; but more commonly their substance is penetrated with earthy matter, and they are incorporated with the stone. They first appear in the transition class of rocks, and in them their forms are the most simple. Those in the oldest rocks, as limestone and slate, are chiefly mollusca, as corals, ammonites, nautilites, &c. while vegetables seldom occur, except reeds and ferns.

In mountain limestone and red sandstone the above are found, and more numerous vegetables. The coal formations abound in cacti palms, reeds, and ferns; the magnesian limestone, which

rests on coal, contains numerous fish and amphibia.

The second sandstone contains both trees and shells. Lias and oolite abound in bivalve-shells, spines of fishes and bones of turtles, crocodiles, opossums, and fossil woods, besides ferns and reeds.

Under the ruins of an ancient town, near Modena, standing trees have been found, beneath these beds of shells, and beneath these vegetable remains. Ancient authors, Greek and Roman, speak of many such discoveries in their time.

The site of ancient Rome is on volcanic products, covering a marine formation.

Trees are often found in Lapland and Siberia converted into iron ore and carbonate of copper. Lignites are petrified trees, in a state between peat and coals.

The most acute geologists agree in opinion that the vast beds of secondary limestone, and most of the secondary calcareous strata, have been the production of shell-fish and corals; and are distinct from the granite, gneiss, and their silicious and argillacious ruins which compose other strata.

Fossil shells are found in mountains every where; and they abound in the stones of which the Egyptian, Grecian, and Roman structures are formed.

Seventy genera of univalve shells have been discriminated; and other shells are so numerous and novel as to fill large books with their description. Their masses are so great, that many have supposed that the vast mountains of limestone are formed of their remains. Marbles are composed for the most part of them, and in many kinds the forms are perfect. They are found at every depth which has been penetrated, and under beds of stone a thousand feet thick.

In France, at 100 miles from the sea, a single oyster-bed was found, which, in oysters and other marine bodies, is equal to 500 millions of cubic yards.

Ninety species of bones of quadrupeds have been found, and discriminated, which are now unknown.

Elephants, and animals much larger than elephants, called Mammoths, have been found in Europe, America, and Siberia. One found near Abingdon, now at Oxford, is sixteen feet high, and its bones were mixed with those of other large animals; another was found in Siberia in the ice, quite perfect in its flesh, skin, hair, and eyes, with a long mane and tail of stiff black bristles; others have been found in Hudson's Bay. The gigantic mastadon is found in North America and Siberia. The gigantic tapir, twelve feet high and eighteen feet long, has been found in different parts of Europe. Whales are found in Essex, in London clay, and in Bath limestone.

Bears, dogs, foxes, and wolves, are found in diluvial soils and caves; hyenas and tygers in limestone caves and marl; the teeth of horses, elephants, rhinoceroses, hyenas, bears, wolves, tigers, &c. are found in masses in diluvial soils; oxen in peat bogs in several countries; deer and elks in peat bogs and marl pits; one six feet high and nine feet long was found in the Isle of Man, in marl, covered with sand, then the peat, and then the vegetable soil. Rhinoceroses are found in every part of Europe, and in the arctic circle; the hippopotamus is found in England, France, and Germany.

A bat has been found in limestone, opossums in slate, guinea-pigs, rabbits, rats, and beavers in limestone: the sloth, one fourteen feet long, in South America, and in limestone caves.

In 1821, the bones of an enormous mammoth were found near Rochester.

Madrepore rocks are found in the West India Islands, on the highest primitive mountains.

There are beds of sea-shells 2000 feet high, on Etna, and strata of grey clay, filled with shells, much higher. The base is lava and marine substances in alternate layers; and beneath a stratum of lava is a stratum of rounded pebbles, while above it are calcareous eminences formed by the sea. A Sicilian canon, who examined some of the beds of lava, separated by rich soils, has calculated that at least 14,000 years have passed during their formation.

Elephants' bones have been found in diluvial strata, in nearly every country of England and Wales. Never in the older strata, and not in the modern alluvial soils. Europe and Northern Asia equally abound in them, as well as in those of the rhinoceros, tyger, hippopotamus, &c. &c.

A mammoth's bones have been found at North Cliff, Yorkshire, surrounded by thirteen species of fresh-water shell, still found in the district.

The museum of G. Mantell, Esq. of Lewes, consists principally of Fossil Organic Remains, illustrative of the Geology of Sussex, and the finest collection of Chalk Fossils in the kingdom; His most important discoveries were made in the beds of weald clay, &c. below the chalk and green sand formation, and exclusively the remains of marine animals. The strata of the former contain, almost exclusively, the remains of terrestrial plants, and shells

analogous to fresh-water shells, or the bones of vertebrated animals; some of which were of enormous magnitude, and were evidently formed for walking on solid ground. The strata in which these are found must have been deposited in a fresh-water lake or estuary, or in the bed of a mighty river, on the sides of which lived and flourished plants and animals analogous to those of tropical climates. The beautiful fossil fishes allied to the Zeus or Doree, from the chalk near Lewes, are particularly interesting; one of them is a matchless specimen, the mouth being open and entire. But the most remarkable circumstance is the uncompressed and perfect form of the bodies, owing to the preservation of the air-bladder, for it appears unbroken in many of the specimens; proving that the bodies were completely encased in the chalk before the putrefactive process had commenced. In some of the fossil fishes, the fins, gills, and teeth are preserved, as well as the air-bladder and tongue; the scales are also very distinct. Vegetable remains in chalk are extremely rare; there are, however, in this collection fine specimens of wood, and in the centre of flints, and also various remains of marine plants. The fossils from the Sussex beds, beneath the chalk formation, appear allied to the ferns and palms, &c. of tropical climates, and prove the existence of dry land, at or before the period when the strata that contain them were deposited. But it is the remains of large animals evidently formed for walking on land, that renders the museum of Mr. Mantell so unique. In the strata of Tilgate Forest, Mr. M. has identified no less than four gigantic reptiles, and there are also the remains of three species of turtles from the Sussex beds, two of which are supposed to be fresh-water; the remains of fishes are also numerous.

The British forests decribed by Cæsar are now chiefly peat-bogs, and Roman roads are found eight feet deep in them. The black tint is derived from oxide of iron in the plants, and the antiseptic properties arise from carbon, and gallic acid. Men, animals, trees, &c. are found in bogs in high preservation; and when a silicious or calcareous stream passes, rocks are deposited, petrifactions formed, and trees preserved in the standing positions in which they were at first protected by the peat.

The geological period when the existence of reptiles commenced, must, according to the present state of our knowledge, be placed immediately after the formation of the coal measures; the remains of monitors having been found in the bituminous schist of Thuringia; and those of a crocodile in the gypseous red sand-stone of England: but it is not till we arrive at the lias that the remains of reptiles occur in any considerable quantity. At that period the earth must have teemed with oviparous quadrupeds; and the various marine genera which inhabited the sea appear to have been equally numerous with those of the land and rivers. The prodigious quantity of the remains of these animals which has, within a comparatively short period, been found in England alone, is truly astonishing; and if to these we add the immense numbers that have been discovered in France, Germany, &c. and reflect that, for one individual found in a fossil state, thousands must have been devoured or decomposed: and that, even of those that are fossilized, the number that comes under the notice of the naturalist must be trifling compared with the quantities unobserved, or destroyed by the labourers, we shall have a faint idea of the myriads of "creeping things" which inhabited the ancient world.—*Mantell.*

In the extensive marine formation, the chalk which covers the Hastings beds, reptiles are less numerous, and the megalosaurus, iguanodon, and other herbivorous genera, disappear altogether; no traces of their existence occurring after the last-named strata were deposited. At the epoch of the chalk formation, the ichthyosaurus, and one or more species of crocodile, and marine turtles existed; and another extraordinary reptile, the Mososaurus (lizard of the Meuse) or fossil animal of Maestricht, first appears. This creature, so celebrated in Oryctology since the first discovery of its head and jaws by Hoffman, attained the size of the crocodile, and held an intermediate place between the Monitors and Iguanas. It appears to have been aquatic, swimming in the manner of a crocodile, and moving its vast tail from side to side as an oar. With the chalk the "Age of Reptiles" may be said to terminate. The greater part of the genera above noticed appears to have become extinct during the changes which took place on the surface of the earth at that period; the crocodiles, turtles, &c. alone survived, a new order of things commenced, and, in the tertiary formations which succeeded, we perceive an approach to the modern condition of the earth.—*Mantell.*

The greatest collection of fossil bones yet found in England is at Banwell, at the western extremity of the Mendip Hills. They are in vast caverns deep

in the limestone rocks, and consist of species of oxen, deer, wolves, bears, &c. mostly extinct.

The most surprizing caves and galleries of communication found in England are the extensive series found in a compact limestone mountain at Oreston, near Plymouth. The bones and teeth of the rhinoceros abound, with those of deer, bears, oxen, and horses, and some jaws and teeth of the hyena. Horns of various animals, and in one cavity a quantity of shells. Some were on the floor, covered with mud and clay, others adhered to the sides, and some on ledges of the rock; while others appeared to be crammed into crevices and fissures. None of the bones exhibit the marks or power of hyenas' teeth, as at Kirkdale.

The caves in England and Germany contain bears, hyenas, rhinoceroses, elephants, and hippopotamuses, of species similar in all but not now extant; such as are still found in the diluvial strata in their vicinity, yet different from those to be fonnd in the superficial strata formed since the dilavial action. They also contain mud and pebbles, washed in at the last or some previous submersion.

Caves with bones are of two kinds, those inhabited by carnivorous animals and the bones of anti-species, and those of bones of contemporary species into which they have fallen, through external fissures.

The caves of bones of animals of different species frnm the present species, and of warmer climates, seem to prove that they were formed at least befnre the last submersion, or when the Tropics were eight or nine degrees wider than at present, and those in England when it was united to the Continent. The cave at Kirkdale contained five different species of Tropical animals.

In regard to the hyena, Professor Buckland saw an hyena eat, and found that the bones left exactly agree with those in the caves, and that the excrement found in them exactly accord with those of the living animal. He compares the power of an hyena's jaws to the miner's crushing-mill, or to the shears in iron-foundries. They are so voracious that one at Paris, in the Jardin des Plantes, eat off his own leg, and long walked on three legs.

The cave at Liege presents different layers of staglamite with exuviæ in each, indicating a series of distinct geological epochs, probably retnrns of the periheliun, at intervals of 20,930 years.

Two caves full of bones have lately been discovered in France, and in one of them remains of rude pottery.

The Kentucky cavern has been penetrated above fifteen miles, a small portion nf its real size. A female mammy found in it has been a vulgar show through the United States.

Crocodiles have been found *beneath* the chalk, alligators and tortoises *in* the chalk. Fnssil bones exist *beneath* the chalk. Hence it is inferred, that dry land and fresh water existed before the chalk. Mammiferous lamentins and seals are first found in the coarse shell limestone which covers the chalk; and above this, in sand and rounded pebbles, the remains of mammiferous land animals, but of different species from the present. Forty-nine are new; seven belong tn new genera, and other twenty-two belong to new species of known genera. The bones of species now known are never found but in light, apper, alluvial deposits. Several successions of convulsions and changes are evident; but as the last and every overthrow was of rocks in mass, which themselves contain shells, vegetables, bones, &c. &c. the previous existence of such is undeniable. The imbedding in strata of such multitudes of testaceous fish, who could not be drowned, proves that dessication, as well as water, has been an alternately operative cause.—*Cuvier.*

The following are the General Conclusions, by Mr. W. Phillips, in his Outlines of Geology and Mineralogy:

1. The *lowest and most level* parts of the earth consist of horizontal strata, composed of varioas substances, many of them containing marine prnductions.

2. *Similar strata* are found *in hills* to a great height.

3. Shells are sometimes so numerous as to constitute an entire stratum.

4. Shells are found in elevations *far above the level of the sea*, and at heights to which the sea could not be raised by any existing cause.

5. These shells once lived in the sea, and were deposited by it.

6. Shells cnutinae to be found as we rise to the foot of *great chains of mountains*.

7. At this elevation, the strata, instead of being horizontal, as in plains, have various degrees of inclination, and are sometimes vertical.

8. From these and other circumstances, we infer that there have been frequent irruptions and retreats of the sea.

9. As we approach the *summits of lofty mountains*, the remains of marine animals and shells become rare, and even wholly disappear.

Surturbrand, or black mineralized wood, is found in Iceland, either oak or pine. And near it a stratum of schistus in plates, like writing-paper, with im-

pressions of leaves like poplar or willow.

The Sondah, or Black Mountains, in Africa, are of basalt, 1500 feet high, 100 miles wide, from north to south, and many hundred long.

At Bigbone Lick, near Cincinnati, are found masses of bones of the mammoth, and also hoofs of horses, in a fossil state. Mr. Bullock has found the head of a mammoth with signs of a trunk.

The British Islands (says Lyall) have been drained by great rivers, inhabited by crocodiles and gigantic oviparous reptiles, belonging to extinct genera.

Above two-thirds of the surface of Modern Europe are covered with remains of aquatic animals, &c. of tertiary species, proving undoubted submergence.

The great Cavern of Guarcharo, in the Caraccas, frequented by myriads of owls, is eighty feet wide by seventy-two high, and nearly a mile long. Its darkness is no security against human depravity; for, to pamper the monks and missionaries, the Indians, with lights and long poles, in spite of the shrieks of the old birds, go annually and kill thousands, which they rip open while warm, to express the fat for the monasteries and colleges. In the convent of Caripe (says Humboldt,) no oil but this is used in the monks' kitchen.

The arborescent fossil forms found in our coal-beds have also been found at Melville Island. The old strata indicate greater heat in the temperate and polar circles than exist at present.

The north Polar Regions consist chiefly of primitive and transition rocks, with few secondary and alluvial, no volcanic, and slight tertiary strata. Coal of the oldest formation was found at Melville Island; also tree-ferns and fossil corals, with fossil dicotyledonous woods in Baffin's Bay, &c. Iron ores, copper ore, and graphite; garnets, rock-crystal, beril, and zircon, were also found.

Italy consists of a central calcareous chain, highly inclined, flanked to the sea with strata, nearly horizontal, and obviously deposited by the seas on each side. The Alps are similar, central, and flanked by tertiary deposits, to the height of 2, 3, or 4000 feet, and containing some existing animals.

Mountains in Sicily, 3000 feet high, abound in existing testacea and zoophytes.

Two or three hundred species of cryptogamous plants are found in carbonaceous strata, but dicotyledonous are rare. From 100 to 200 species of shells have been found in these strata. The organic remains of the secondary strata consist of corals and marine shells; and in the British strata, from the inferior oolite to the chalk, there are about 600 species. Vertebrated are fish and reptiles.

1200 species of testacea have been found in the Paris basin, and as many in the sub-Apennine hills.

The fossil shells found round the Mediterranean are larger than the same species now found in that sea; but they are still formed of the same size in the Indian Ocean. Many are not now found in the Mediterranean of any size, but only in the Indian Ocean.

Shell-marl, in Scotland, contains skeletons (in numbers as named,) of stags, oxen, swine, sheep, dogs, hares, foxes, wolves, and cats. Beavers are scarce. But even these specimens would go before our historic period.

At Whookey Hole, near Wells, fragments of human skeletons have been found embedded in red marl and clay, and the bones were as brittle as those of the hyena found in that and other caves. Bones of man and pottery have also been found in the South of France, in beds containing extinct mammalia and land shells, and consisting of calcareous matter and staglamite. It follows that man is as old as the extinct species, or the extinct species as modern as man is alledged to be.

Very ancient human bones, completely fossilized, have been found in caverns, and in several parts of France, palpably of higher antiquity than the Gauls, or of the British bones found in tumuli.

The stone which encloses the Guadaloupe skeletons is harder than marble. Yet theory regards them as of recent occurrence.

Eight fossilized canoes were found on draining Martin Meer, in Lancashire, like American canoes. In draining Loch Doon, seven have been found, hollowed out of oak-trees, twenty-three feet long, two and a half deep, and three and a half wide. In one a war-club, and a stone battle-axe.

A fossil forest has been discovered under the banks of the Tiber, petrified with calc-sinter, mixed with volcanic dust.

In the century before C. Oojain, and nearly 100 other towns in Malwa and Bagur, near the Nerbuddah, were buried by an apparent volcanic eruption. Their reliques have been traced, and important discoveries of MSS. expected.

It appears that the fossil turnibated univalves, which are herbivorous, and which Adanson found in the African seas, are found only in the older beds from transition limestone to lias; and that all the genera of the same shells which are carnivorous, as appears by

their notch or canal, belong to the strata above the chalk, and are extremely rare in the secondary strata, seldom being found with the Ammonites and other Nautilidæ, which become extinct when the chalk formation was completed.—*Dillwyn*.

Bodies imbedded in the sea require 3 or 4000 years to become fossils.

The Guadaloupe human bones were not completely fossilized, but retained some animal matter.

Whenever the tropics extended to 45°, about 150,000 years since, (at 52 seconds per century) the arctic and tropical circles would coincide, and the animals and vegetation of both zones would assimilate, as we find was the case in the fossils.

The diluvial remains of England indicate a current of the sea from the northward, just such as would obtain on the passage of the perihelion into southern declination. The Thames is charged with pebbles from the Licky Hill, near Birmingham.

In Forfarshire are found beds of calcareous marl, lying over beds of drift peat, sand, and fossil clay. The marl contains shells of modern species and marine plants.

The estuary of the Ouse, between Lewes and Newhaven, consists now of vegetable mould, over a peat bed of five feet, containing trunks and roots of trees. Then blue clay, fresh-water shells, and skeletons of deer. At 30 feet are marine testacea, &c.

Donati found that the new deposits in the bed of the Adriatic exactly resemble those of the sub-Apennines on the adjacent shores.

Lyell ascribes the different aspects of the old and newer rocks to chemical changes and pressure.

Bones of several elephants, of a rhinoceros, &c. have been found in one spot near Ilford.

It is estimated, by various observations, that corals and mollusca raise a coral reef about six inches in a century, so that a reef a mile deep would employ 10,500 years, and there are some in much deeper water.

Fossil bones of the great mastadon, and other animals, have been discovered in the Birman Empire.

Eight species of birds are found in gypsum, near Paris. Crocodiles are found in blue clay in Dorsetshire, and on the opposite French coast.

Lizards, twenty-four feet long, equal to the dragons of antiquity, are found at Maestricht and Bavaria.

Lizards found at Stonesfield must have been forty feet long and eight feet high. Fossil fishes occur every where, and in all forms. Crabs are numerous, as well as other shell-fish.

Insects are found in slate, and flies and ants in amber; and a perfect scorpion was found in a piece of amber.

Bullock describes a fossil lizard 150 feet long.

Ammonites, a univalve shell, is the most common organic remain, but not now in existence as a living genus.

The molar tooth of a mammoth weighs 8 lbs.; and the knob of the bone of the leg is a foot in diameter. It was a carnivorous animal, and the Indians have traditions of their terrible mischiefs.

Wood is found in Languedoc, part jet, part wood; and trees have been found converted into jet, but so entire as to distinguish their species, as walnut and beech.

In Zealand, twenty-four feet below the level of the sea-dyke, there have been found turf, old alder, and other trees.

It is suspected that the bones of apparent birds, found at Stonesfield, &c. are pterodactyles, or extinct species of flying reptiles.

Ink bags, like those in the cuttle-fish, are found in the lias at Lyme.

The bezoar stones, found at Lyme, in lias, are the fæces of the ichthyosaurus.

Sharks' teeth and fishes' teeth abound in Oxfordshire.

The strata near Reading consists of a deep bed of clay, three feet of coarse fullers' earth, four feet of green sand, one and a half foot of sandy clay, two feet of oyster-shells, one foot of sandy clay, thirty feet of chalk, and a bed of flint. In other places, fossil shells, sharks' teeth, and remains of fish, are found; and in others, bones of animals, and remains of birch-trees.

On the shores of the Mersey, at Liverpool, at nineteen feet, was found fine sea-sand; then a firm bluish marl intermixed with lichen, fibres, and leaves; then branches of trees; then trunks and roots of oaks, firs, &c.; then marl, and at thirty feet a pair of stag's horns; then black peat, with nut-shells, fibres of timber, &c. a foot thick, resting on the rock forty feet below the quay, and twenty below the level of the pool.

Insects are found perfect in amber and copal, which must have been of great antiquity. They afford new genera and species.

In the thirteenth and fourteenth century the face of Scotland, according to Tytler, was covered with immense forests of oak, filled with deer. Inverness, Elgin, Aberdeen, &c. &c. were covered with wood; and Stirling and Perth had extensive royal forests. The remains of large trees, of oaks, ash, beech, &c. are constantly found deep under the surface. Bears, wolves, wild

boars, and bisons also abounded in them. Bears were extirpated in the thirteenth century and wolves in the seventeenth century. Beavers also abounded in the lochs.

On the descent of an excavated sandstone-rock, near Lochmaben, then soft, there have been found, for forty or fifty yards, four tracts of animals, distinctly marked in uninterrupted continuity, with regular alternations of right and left foot and the heel and toes; supposed in one case to be the tortoise or crocodile: and the most distinct were on rocks sixty or seventy feet below the modern surface.

There are now 50,000 species of fossils recognized, but they are believed to be of very distant epochs.—*Lyall.*

M. de Basterot states, that, of the shells which occur, fossil, are—

	Genera.	Species.	Resembling the existing.
Chambered . .	29	297	6
Univalves . . .	81	1141	151
Multivalves and Bivalves . . .	111	1091	107
	221	2529	264

Cuvier classed the remains of 100 fossil quadrupeds, mammiferous and oviparous, of which 70 were wholly unknown and 40 belong to new genera. A fourth were oviparous, and 13 genera were *pachydermata*, or thick-skinned.

Egyptian remains and sculptures resemble the animals of our days. The ibis is the same now as in the tombs.

From certain appearances of many destroyed animals, Cuvier, &c. infer that the cause was sudden, and it might be so in localities, and yet be gradual as a general operation. A constantly growing sea would often encroach on, and break down barriers so quick as to make sudden irruptions into valleys, by which their inhabitants would be surprised. So retiring lakes would bear down their bounds, become suddenly dry, and surprise the fishes by dessication. Universal suddenness is grossly absurd, and with reference to any hypothesis proves too much.

Pallas tells us, that the islands of the Icy Sea are full of elephants' and rhinoceros's bones, and that the islands opposite the Lena are almost composed of them and fossil wood—a proof, in spite of Cuvier, that the Tropics once extended to 45° or upwards, forming but two zones on each side the Equator.

Melville Island is floetz sandstone over coal and ironstone; and the sandstone contains remains of arborescent ferns, with impressions of stems of an incrinus and a striated reed. Jameson concludes that forests once grew there, while corals indicate a climate adapted to *polyparia*.

Hutton, in 1774, on the hypothesis of the Scandinavian hell, supposed there is a central fire expanding the earth; and then a reaction in the air and water, compressing and counteracting, each getting the better when the other had attained a limit.

Deluc, in 1790, denied the sufficient agency of air and water to produce the changes, and maintained that the Deluge arose from the compression of the earth by the sinking of the Old Continent, by which their beds were filled with the water that had previously covered the present continent.

Dolomieu and Cuvier adopted this theory, and La Place concurred.

The Editor contends for physico-astronomical causes and alterations. He considers the Earth as he would a planet—just as Mars or Jupiter, and regards the changes as superficial, and as caused by agency present in the planet. In examining the actual elements of change, he finds it in the varied distance of the planet in every revolution, and in the necessity that some local means should produce equally varied forces of reaction in the planet. He then finds that the major axis of the orbit, or nearest and remotest points, go round the ecliptic in 20,930 years, and are half the time over the Southern and half over the Northern Hemisphere; so that as the perihelion is over either, the centrifugal force ought to be greater in that hemisphere. Water, then, of the bodies present, is that mobile agent which in excess would produce the required increase of centrifugal force; and on looking at the facts, he finds the perihelion nearly extreme south, and in 500 parts 146 more active water in the Southern Hemisphere, and exactly 146 more inert land in the Northern; the cause and effect and effect and cause are therefore palpable. This explains exactly all the successive submersions and changes in periods of time Nature-like and God-like. Then other changes arise from the gradual rectification of the axis of the Earth, by the levelling and equalizing of those inequalities which determined the axis of rotation at the first; tho axis being then the necessary centre of all the masses; but these must have been very unequally disposed, or the plane of the rotation and orbit-revolution must have coincided. What the inclination was we cannot exactly determine, but all the phenomena of fossils indicate that the Polar and Tropical Zones once touched each other, if they were not partially blended, *i. e.* 23°.28′ was once 45° if not 50° or more.

GEOGRAPHY.

Relative size in square geographical miles of thirty of the greatest empires and states.

Russia, in Europe and Asia	5,912,000
English dominions, Europe, Colonies, and Dependencies	4,457,598
Chinese Empire	4,070,000
Brazilian do. and Depend.	2,313,000
United States and do.	2,300,000
Mexico	1,242 000
Ottoman Empire	1,000,000
Columbia	823,000
Buenos Ayres, &c.	683,000
Portugal and Colonies	430,000
Peru	373,000
Persia	350,000
Denmark and Colonies	341,000
Bolivia	300,000
An-nam, in Asia	270,000
Netherlands and Colonies	252,000
Spain and Colonies	214,400
Sweden and Norway	223,000
Tripoli	208,000
Austria	194,500
France and Colonies	188,000
Japan	180,000
Boukara	173,000
Caubul	172,000
Khiva	145,000
Birman Empire	140,000
Morocco	130,000
Chili	129,000
Siam	124,000
Abyssinia	120,000

The following Table of the Population will further illustrate.

Chinese Empire	170,000,000
British Empire, including Hindoos, Hottentots, Negroes, Indians, &c.	140,450,000
Russia, including Calmucks, Tartars, and savage tribes	62,000,000
Austria	32,554,000
France	32,000,000
Japan	25,000,000
Ottoman Empire, including Egypt, &c.	24,000,000
Spanish Monarchy, including Cuba, Philippines, &c.	17,988,000
Netherlands, Javanese, &c.	15,562,000
United States, including Negroes, &c.	12,000,000
Persia	9,000,000
Mexico, including Indians	7,500,000
Two Sicilies	7,420,000
Caubal	0,500,000
Brazil	5,000,000
Portugal, including Congese, &c.	5,607,000
Morocco	4,500,000
Sardinia and Savoy	4,300,000
Sindia	4,000,000
Sweden	3,860,000
Columbia	3,000,000
Roman States	2,590,000
Denmark, including Greenlanders and Negroes	2,125,000

The population of the Globe for the two last centuries was estimated at 1000 millions; but modern calculators, in 1825, reduced it to 650 or 700 millions. If, then, a doubling took place every 25 years, according to an absurd theory, the population in 1800 would have been but 300 millions. In 1775, but 150 millions. In 1750, but 75 millions. In 1725, but 37½ millions. And in 1700, but 18¾ millions. And in the reign of Charles II. but 9⅜ millions. So that in the time of James I. even when public writers estimated the population at 1000 millions, according to Malthus and his disciples, there ought only to have been Adam and Eve in Moses's Paradise. Comparing deaths with births, the arithmetical principle of doubling, under favourable circumstances, really takes place in only about 260 years. But it may be doubted whether, in the aggregate, the Earth was not as populous in the age of Augustus as at present.

Europe contains 2,793,000 square geographical miles, and 227,700,000 inhabitants; or about 81 to a square acre, or 1 to every 10 statue acres.

Asia 12,118,000 miles, and 390 millions of inhabitants; or 32 to every square mile, 1 to 25 acres.

Africa 8,516,000 miles, and 60 millions of inhabitants; or 7 to every square mile, or 1 to every 115 acres.

America 11 millions of miles, and 39 millions of inhabitants; or 3½ to every mile, or 1 to 230 acres.

Of 100 parts, into which the surface of the land may be considered as divided:

Europe contains	7
Africa	21
Continental Asia	33
New Holland, &c.	8
South America	15
North America	16
	100

The torrid zone is 16.5 millions of square miles. Each temperate zone is 51.55 miles, and each frigid 34.66. The whole 199 millions nearly. The two temperate and the torrid being 120 millions.

The first recorded map was drawn by Aristagoras, of Miletus, about 480 B. C. Others imitated it; and many of the ancient philsophers transferred the degrees in the Heavens to the Earth, and guessed a terrestrial degree to be about 69½ miles as the 360th part of the sphere. Nevertheless priestcraft so blinded men, that, in 1550, the Pope gave to the King of Spain all countries to the west, as an extent of plain; and the rotundity of the Earth was treated as a heresy.

Latitudes *and* Longitudes *of Principal Places.*

	Lat.	Long.
	° ′	° ′
Alexandria, Egypt	31 11 n	30 17 e
Amsterdam, Holland	52 23 n	4 52 e
Archangel, Russia	64 34 n	38 30 e
Athens	37 40 n	23 52 e
Babelmandel	12 50 n	43 50 e
Batavia	6 12 s	106 45 e
Bengal	22 0 n	92 45 e
Berlin	52 33 n	13 26 e
Bombay Isle	19 42 n	73 3 e
Boston, America	42 25 n	70 37 w
Breslau	51 3 n	17 13 e
Brest	48 23 n	4 30 w
Bristol	51 28 n	2 30 w
Buenos Ayres	34 35 s	58 0 w
Cadiz	36 31 n	6 7 w
Calais	50 58 n	1 51 e
Cairo, Egypt	30 2 n	31 26 e
Cambridge	52 13 n	0 4 e
Canary Islands	28 1 n	15 0 w
Canton	23 8 n	113 2 e
Cape of Good Hope	34 29 s	18 23 e
Cape Horn	55 59 s	67 26 w
Carthagena	10 27 n	75 26 w
Charles Town	33 22 n	79 50 w
Clifton	53 28 n	2 32 w
Constantinople	41 1 n	28 54 e
Copenhagen	55 41 n	12 50 e
Corinth	37 30 n	23 0 e
Cork	51 54 n	8 30 w
Dantzic	54 22 n	18 36 e
Dover	51 7 n	1 19 e
Dublin	53 20 n	6 55 w
Edinburgh	55 58 n	3 1 w
Ferro, Isle	27 48 n	18 6 w
Finisterre, Cape	42 51 n	9 36 w
Genoa	44 25 n	8 41 e
Gibraltar	36 5 n	4 46 w
Glasgow	55 52 n	4 5 w
Goa	15 31 n	73 50 e
Gottingen	51 32 n	9 58 e
Greenwich	51 29 n	0 5 e
Hacluit's Head	79 55 n	12 0 e
Halifax, America	44 40 n	63 20 w
Havannah	23 12 n	81 11 w
Helena, St.	15 55 s	5 49 w
Ispahan	32 25 n	52 55 e
Jerusalem	31 50 n	35 25 e
Land's End	50 6 n	5 50 w
Leghorn	43 33 n	10 25 e
Leostoff	52 38 n	1 54 e
Liverpool	53 22 n	3 10 w
Lima	12 1 s	76 50 w
Lisbon	38 42 n	9 4 w
Lizard	49 57 n	5 21 w
London	51 31 n	0 0
Madras	13 8 n	80 7 e
Madrid	40 25 n	3 45 w
Manilla	14 30 n	120 25 e
Marseilles	43 18 n	5 21 e
Mexico	19 54 n	100 5 w
Mississippi, mouth	20 0 n	89 17 w
Moscow	55 25 n	37 51 e
Naples	40 51 n	14 19 e
Newcastle	55 0 n	1 18 w
Oporto	40 53 n	8 35 w
Orkney, I. north end	59 24 n	3 23 w
Oxford	51 45 n	1 16 w
Paramatta	33 49 s	151 0 w
Paris	48 50 n	2 25 e
Pekin	39 55 n	116 22 e
Petersburgh	59 56 n	30 19 e
Philadelphia	39 57 n	75 18 w
Plymouth	50 24 n	4 15 w
Port Mahon	39 51 n	3 53 e
Port Royal, Jamaica	17 40 n	76 37 w
Portsmouth	50 48 n	1 1 w
Prague	50 5 n	14 15 e
Quebec	40 55 n	71 12 w
Rio Janeiro	22 55 s	00 0 w
Rome	41 51 n	12 32 e
San Blas	21 30 n	00 0 w
Scilly Islands	50 0 n	6 45 w
Smyrna	38 28 n	27 25 e
Stockholm	59 22 n	18 12 e
Syracuse	37 4 n	15 20 e
Tangier	35 55 n	5 45 w
Teneriffe	28 16 n	16 32 w
Tunis	36 47 n	10 10 e
Turin	45 5 n	7 45 e
Venice	45 27 n	12 24 e
Verd, Cape	14 47 n	17 28 w
Vienna	48 11 n	16 28 e
Upsal	59 52 n	17 43 e
Uraniberg	55 54 n	12 52 e

Maps which reckon their longitude from *Ferro* require 18° 6′ to be added, and from Paris 2° 25″ to be deducted, to reconcile them to British maps.

The Cape of Good Hope, Buenos Ayres, and Botany Bay are in *the same latitude*, 33 to 35 *south*; and equal to Nankin, Bagdad, Cairo, Gibraltar, Madeira, Bermudas, and Charles-Town *north*.

Ceylon, Sierra Leone, and St. Fé, are in 8 or 9 *north*, and Truxillo, Olinda, Congo, and Java the same *south*.

London is nearly in the same north latitude, 51 and 52, as the Fox Islands, Winnepeg Lake, Antwerp, Berlin, Warsaw, and the south point of Kamschatka; and as Patagonia, *south*.

Philadelphia, 40 deg., is in the same *north* latitude as Madrid, Naples, Samarcand, and Niphon, in Japan.

Paris, in 49 deg. is in the same *north* latitude as Brest, St. John's, Newfoundland, Nootka Sound, Vienna, Astrachan, and Pekin; and as Bass's Strait to the *south*.

Rome, 42, the same as Boston, Trebizonde, and North Corea.

The Galipagos, Quito, the Amazon's mouth, Sumatra, and Borneo are on the equator.

The most northern known land is Spitzbergen, lat. 80; and the most southern, Trinity Land, in 66.

At 10 degrees distance, or 692 miles,

from London, very nearly, are Bergen, Gottenburgh, Bornholm, Dresden, Prague, Lintz, Mantua, Barcelona, Toledo, Madrid, Ferrol, and the Faro Islands.

At 20 degrees, the coast of East Greenland, Madeira, Morocco, Lepanto, Adrianople, Ismael, Smolensko, Petersburgh, and Tornea.

At 50 degrees distance are Cabul, Kandahar, Rostak, Mocha, Gulf of Guinea, Bermudas, Philadelphia, New York, and Lake Ontario.

Jamaica is 68 degrees, Panama 77, Berbice 65, the Azores 24, Rio Janeiro 84, St. Helena 67, Cape of Good Hope 88, Bombay 63, Cape Comorin 76, Madras 74, Calcutta 72, Delhi 61, Constantinople 22½, Jerusalem 33, Mecca 44, Astracan 31, Moscow 23, Tobolsk 38, Vienna 11, Rome 13, Palermo 17, Marseilles 9, Algiers 16, Cairo 32, Sierra Leone 44, of 69.2 miles to a degree from London.

In calculating the distance of places on the Globe, the latitudes and longitudes being given, and the longitude reduced to measure at equator, the ratio is as radius is to the cosine of the difference of latitude, so is the cosine of the difference of longitude to the cosine of the degrees in the distance, which by 69 is the miles. The shortest way is to measure it on a globe.

The Polar Seas were explored by Barentz as far as lat. 80° 11′; and Phipps, to lat. 80° 48′; but beyond this point they present an impassable barrier of ice. Parry ascended no higher than 75°. A ship from Hamburgh, in 1817, professed to have reached the eastern coast of Greenland, and to have sailed along it to the 80th degree, though that coast had, for four centuries, been blocked up with fields of ice. Russian voyagers to the north of Siberia have been unable to pass Cape Vostochnoi. In the sea north of the American coast, Parry proceeded to long. 113° 46′ 43″ W. When he wintered in lat. 75° the spirit thermometer fell to 55° below Zero. The current sets in these seas from west to east, flowing through Behring's Straits round to Baffin's Bay. The mean annual temperature of Melville's Island appeared to be below Zero.

If a northern route were practicable, the distance to China would be reduced one half, or from 17,000 miles to 8,000.

The South Polar Sea has not been penetrated higher than 71° 11′, and there it presented dangerous and impenetrable fields of ice. There does not appear to be any southern continent, as has been vainly supposed, but there are some barren islands.

Widdell, in 1825, sailed to 74° 15′ S. lat. long. 34.17 when he was obstructed by ice-islands.

The Black Sea has 15 degrees of longitude at 53 miles each, and from 4 to 5° of latitude of 69.2. The Caspian has 4° of lougitude of 52 miles, and 10° of latitude. The Mediterranean is 40° long. of 55 miles, and 3 to 8° wide, of 69.2 miles. The Red Sea is 18° of 69.2 miles long, and 2 to 3° broad of 64 miles each.

Geography presents differences of all kinds. Different temperatures; different plants; different animals, birds, and fishes; and different men, in constitution, colour, and habits. In the same climates, their genus may be the same; but, at great distances, the species are different, in plants, insects, fishes, birds, &c. and those of one country are not in species like those of another.

All nations are governed in subservience to their customs, religions, and habits; but in some the will of the prince has no restraint, and he is above the law, and this is a *despotism*. In others the laws are paramount under a prince, and this is a *monarchy*. In some the law is paramount, and can be altered only by general consent, and this is a *mixed government*, whether the executor of the law be hereditary as in England, or elective as in America. If the assent to laws and changes is only formal and illusory, it is the worst species of despotism, because responsibility is shifted and evaded, and acts of tyranny are covered by collusive forms.

Whites consider blacks as deteriorations; and blacks consider black as the primitive colour, and white as a deterioration. Humboldt found the inhabitants of the cold regions of Andes, as black as those in the plains, and he considers colour as the mark of distinct races.

Man is found from the 75th degree of north latitude, to the Terra del Fuego, south.

In America 11,647,000 speak English, 10,583,000 Spanish, 3,740,000 Portuguese, 1½ million French, and 7½ million Indian tongues.

The population of EUROPE is between 184 and 200 millions.

There are 48 independent sovereigns in Europe, of whom 29 are in the extent of Germany, and 8 in Italy.

Nova Zembla, an island nearly as large as Great Britain, in the Russian Seas, between lat. 69 and 76, and is too cold to be inhabitated through the year.

Scoresby's voyage on the coasts of West Greenland from lat. 69 to 75, and long. 15 to 21½ west, only 12° from the

Shetland Islands, puts to shame the spirit of Geographical Discovery. He suspects that what we designate a Continent, is but a groupe of Islands, and it appeared every where to have habitations, though he could find no inhabitants. Nor is the coast wholly unproductive of vegetation, as he found patches of pasture, flowers, &c.

The two districts of West Greenland contain about 7,500 inhabitants.

There are nearly 6,000 inhabitants in the Faro Islands. They lie between 61° 20′ and 62° 25′, and between 6° 15′ and 7° 4′ W., and are 22 in number, 17 of which are inhabited. The largest of them, Stromoe, is 30 miles long and 6 broad, and the whole are rocky and mountainous.

In 983, a Danish colony was formed on the Eastern coast of Greenland. In the 14th century, it consisted of 12 parishes, 190 villages, and 2 convents; but in 1406, on the 17th bishop going out, he found the coast closed with ice, and inaccessible. From that period it does not appear that the colony have had any intercourse with the rest of the world, though many attempts have been made to reach it.

Iceland was once covered with forests and culinary vegetables, and large logs of woods are found in the bogs. It now produces only stunted birches 5 or 6 feet high, and cabbages the size of a walnut. When the tropics were 45°, Iceland for 2 or 3 months would be in the relative climate of Cuba, with the addition of constant day for several weeks.

The population of Iceland is now about 50,000. The capital is a mere village, called Reykiarik, and the rest of the inhabitants live in scattered dreary farms in valleys, in a mountainous region of numerous volcanous and boiling springs, oddly mingled with perpetual ice and snow. Other craters besides Hecla spread frequent devastation, and those of Orœfa in 1727, and Skedera Yokol in 1783, will never be forgotten.

The Gulf stream carries immense quantities of trees, &c. &c. of the Mississippi to Iceland, affording timber for building, firing, &c. The eastern corrents bring other supplies to the same seas from the floats of the Oby, Jenisca, and Lena.

The Crimea, added to Russia by Catharine, is the most fertile country in Europe, producing wheat twenty-fold, and the luxuries of the best climate. Four-fifths is steppe or level pastures, but the Southern Peninsula is moontainous, and highly picturesque in lat. 45°.

The Black Sea is now accessible to European vessels, without obstruction from the Turks. The rivers, however, so freshen it, that it is much frozen in the winter, so that Odessa and the sea of Azof are not accessible till the end of April.

Carlscrona, the Royal Dock-yard of Sweden, is famous for its covered docks. Neither at this dock, nor at an old dock, has any subsidence of the Baltic been observed.

Russia, in Europe and Asia, extends over 184 degrees of Longitode, or half round the world, so that when it is 12 o'clock in the day at one part of this empire, it is 12 o'clock at night at the other. The latitude is various, but now extends from 75 to 38 degrees. Its surface covers eight millions of square miles and 5,000 millions of acres, being four times as great as the Roman Empire. The population, including new accessions and all its Siberian tribes, is very nearly 60 millions, of whom several millions are slaves. If half its surface is productive, and Cochrane so describes it, this territory is capable of supporting ten times the whole human race.

Russia was so little known in 1553, that some English ships actually *discovered* the port of Archangel, which was in consequence raised into a seaport of importance.

Dr. Clarke, in his Travels in Russia and Turkey, describes the Russians as still barbarous Scythians, as destroyers of splendid monuments, and as hated for their military despotism, and their religious bigotry, by all the nations over which they extend their baneful dominion. A modern Scotch traveller considers the Russian boors as so nearly allied to brutes, that he often struck them to see whether they were animated. The country is without beaten roads, and the tracks without inns; while all authority is military, and so despotic, that, on crossing the frontier, he fell on his knees and thanked God for his deliverance.

Petersburgh stands on both sides the Neva, and partly on some islands. The depth of water is only from 2 to 4 fathoms. Cronstadt, its port, is 12 miles lower on the north side, and has a well-fortified dock-yard.

The population of Petersburgh in 1829 was 446,895, of whom 5 in 7 were males, and 14,000 foreigners.

The Russian part, in the partition of Poland, was 220,000 square miles.

Odessa is a Russian commercial port, of growing importance on the north side of the Black Sea, between the mouths of the Dniester and Dnieper. It is in latitude 46° 29′ 30″, and east longitode 30° 45′ 22″.

N

The population of (late) Poland is 4,088,269: 3,471,282 are Catholics and 384,263 Jews. There were 2,369 priests, 1,783 monks, and 354 nuns; besides 62 synagogues, 2 mosques, and 43 Protestant chapels.

The useful land in Sweden and Norway is not of greater extent than Yorkshire; but this is compensated by mineral wealth in iron and copper. The population is 4 millions.

Stockholm contains about 80,000 inhabitants; Bergen and Gottenburgh about 18,000 each; Sweden itself nearly three millions.

Stockholm is built on 7 or 8 islands and peninsulas in the channel which leads to Lake Mœlar, a basin capable of holding a very large fleet.

Pine and birch forests cover nearly half the surface of Sweden, and are often burnt to vast extent.

In Sweden, living languages are preferred to dead ones, so that all educated persons speak 5 or 6 fluently.

Swedish tradesmen enjoy their *siesta*, and from 2 to 4 all shops are closed in Stockholm.

In Lapland, in summer, the thermometer stands at 80 in the sun, and 110 in the shade.

Sneehatten, in Norway, is 8,115 feet high: Doverfield 60 miles across is 4,575.

Ant-hills of large black ants, 5 feet high, abound in the woods of Norway and Lapland. They exhibit surprising industry and intelligence, worthy of the sympathy of man.

The road and post terminate in Norway, 700 miles short of North Cape. On the coast the minutest objects are visible 150 feet under water, and present an astonishing variety. The last church is Kelwig, only 9 miles from North Cape.

The hundreds of Islands on the Norway Coast, are inhabited by a very hardy race, who live on fish, eggs of birds, &c.

Tromsoe in lat. 70 is in July covered with verdure, and with forests of birch, aspen, and juniper, to the water's edge. Hummerfest, near North Cape, is a pleasant town and port, with good society.

Near North Cape, the wildest and most dreary spot in the world, lived, in 1822, a merchant, with a well-educated wife and young family in perfect content. It is on the island of Mageroe, and inhabited by Laplanders, reindeer, and foxes, which last display the highest intelligence.

Sweden exported, in 1828, 211,193 schipponts of bar-iron, and 31,000 of other goods.

NORWAY is nearly 1,000 miles long, and about 150 broad. The Dorre Fieldt Mountains, one of which is 8,115 feet high, separates this country from Sweden. The most elevated points are composed of gneiss, and transition rocks lie against it.

The timber trade of Norway employs many thousand hands in cutting down, carrying, and fashioning by saw-mills. The exports are about 1,400 cargoes.

Copenhagen is built partly on Zealand and Amak; the port between is the best and strongest in the Baltic. It is the well-built capital of Denmark, and contains 100,000 inhabitants.

Prussia, in 1828, had $0\frac{1}{4}$ millions of those sheep which supply fine wool, and 5 millions of old breeds. The horned cattle were 4 millions. The taxes 2 millions; the looms 350,000; the ships 6,077, and commerce much encouraged.—*Marshal.*

The Prussian military are affected coxcombs, and detest the Austrians for their gravity.—*Qua. Review.*

The population of Prussia, in 1828, was 12,726,823 or 2,525 per square mile. Berlin contained 236,380, Breslau 90,090 and Konigsberg 67,941.

Dantzic has an unrivalled trade in wheat—the white of Poland and the red of Prussia. From 1,000 to 1,200 loaded vessels depart annually, of which 850 are for Great Britain.

Dresden is the Athens of Germany; and Toplitz in its neighbourhood is the most tasteful watering-place in Europe.

The kingdom of the Netherlands comprises the Austrian Netherlands; and contains about 1,500 square miles, of the most productive land in Europe. The population is about $4\frac{1}{2}$ millions. It is a level country with scarcely 100 unproductive acres, and covered with flourishing towns, comfortable villages, and farm-houses; while the whole is intersected with canals and navigable rivers, and with roads in the best condition. Manufactures, as well as agriculture, are carried to the highest perfection.

Criminal Jurisprudence is in the lowest state in Germany. The untried are treated cruelly, and the trials demand confession as part of the procedure, and even preliminary to punishment—the alternative being a loathsome solitary dungeon, so that false confessions are often made, to escape from them even by death.

Bruges, in the middle ages, was the emporium of Europe, and at that time remarkable for its own splendour and that of its merchants. It was ruined by political circumstances, and is now a second rate, though large town.—The population of Ghent had 83,779, in 1830. —Amsterdam was in 1100 the castle of Amstel, with some fishing huts. After

1235, it began to be a town. It is now one of the noblest cities in Europe.—Holland exports to England 150,000 cwt. of butter, and cheese 100,000 cwt.

Instead of the tyranny of the English workhouse system, the Dutch government have adopted the Chinese plan, and colonized an estate with destitute families. Seven acres are allotted to each, and 133*l.* expended in house and stock. The whole is under a kind and liberal administration, and the profits are from 8*l.* to 10*l.* per annum from each family, after subsistence.

The present extent of Germany is estimated at 249,000 square miles. The population of the several states is about 33 millions.—The German confederation consists of 34 monarchical states, and of 4 free cities.

The Germans are a thinking, pain's-taking, and ingenious people; zealous and warm-hearted, but their public spirit is paralyzed by fetters on the press, and by the multiplicity of allegiances to petty and paltry governments. The domestic happiness of the people is promoted by subdivision of real property among the children, and by laws prohibiting landlords from consolidating farms. But home trade is obstructed by a vexatious multiplication of tolls and custom-houses. The newspaper press too is shackled, and truth perverted by the substitution of State Gazettes for those of free editors.

The free towns in Germany, governed by oligarchies, are Hamburgh, Bremen, Frankfort, and Lubeck, with territories of from 100 to 130 square miles. Hamburgh contains 150,000 inhabitants, and the others 40 to 50,000 each.

Austria contains about 160 millions of acres, one-fifth waste, two-eighths arable, one eighth pasture, and three-eighths woods and vineyards. The population is 34 millions; and including Lombardy, 4 millions, with the Venetian States, Bohemia, Hungary, &c. it is a solid and imposing power.

Bavaria has a population of 4 millions on a territory equal to Ireland. Saxony, Hanover, and Wirtemburgh are, collectively, equal to Bavaria.

Baden, Darmstadt, Cassel, and Mecklenburg, are each equal to the 4 northern English counties, and contain together about 3 millions of inhabitants.

Bohemia is a remarkable country; it is surrounded by mountains 3,000 or 4,000 feet high, and is a plain of nearly a thousand square miles, at one-third of their elevation. The climate is fine, and the soil fertile and productive. The Popish religion is established, but there is a general toleration. The feudal system, however, degrades the condition of the people.

France lies between the 43d and 51st degree of latitude, and contains 128 millions of acres, and it is a country of great production, enjoying the finest climate. The waste land is about one-twentieth; the arable, 56 millions; the pasture, 28; the woodland, 18; the vineyards, 7; olive and other plantations, 3. It is divided into 86 departments and 38,900 communes; and there are 18 archbishoprics and 74 bishops. It is also divided into 22 military districts. Its harbours are, Dunkirk, Calais, Boulogne, Dieppe, St. Maloes, Cherburg, Havre-de-Grace, Brest, L'Orient, Rochelle, Rochfort, Bordeaux, Bayonne, Toulon, Cette, and Marseilles.

In 1777, the quarries of Paris were converted into catacombs, and the bones from the common cemetery of Paris for 400 years, were removed to the quarries, which undermine the city. Burial-grounds without Paris, and all French towns, are now provided by law.

Brest, the depôt of the French navy, has a harbour large enough to anchor four or five hundred men-of-war, in from seven to fifteen fathoms. The entrance, called the Gullet, is very narrow. The town is on a hill, at the north end of the harbour.

Marseilles, Lyons, and Bordeaux, contain about 100,000 each; Rouen and Nantz above 80,000; and Lille and Strasburgh about 60,000.

The military force of Napoleon was 341,000 infantry of the line, 100,000 light-infantry, 77,000 cavalry, 46,500 artillery, and 5,400 engineers; in all 651,000 men. That of England in the same war was 19,200 dragoons, 8,000 light battalions, infantry of the line 149,600, 20,000 German legions, and 96,000 militia; in all 302,800; besides local militia and volunteers, another 200,000.

The present French navy consists of about fifty sail of the line in ordinary, and as many frigates and corvettes.

Spain contains 120 millions of acres, half waste; and about 14 millions of poor, proud, and imbecile inhabitants, borne down by the priests and nobles. The climate and soil are capable of every thing. Wine, wool, and brandy are the chief exports.

Granada is the most variegated district in Europe, with Chains or Sierras of barren mountains and vallies the most luxuriant in the world.

The religious intolerance of the Spanish character arose from the Moors so long occupying their best provinces, and from the 400 years' wars which prevailed.

Spanish wives do not take their husbands' names.

Spaniards uncontaminated with Moorish blood are called *honourable*, however poor, but no rank secures them from the stigma of *mala sangre*, if they have any Moorish mixture.

Cadiz stands on a tongue of land convex to the sea, and the concave side forms the finest harbour in Europe; while the city itself, the harbour, and tongue of land, are exquisitely fine as seen from the hills. It contains 100,000 inhabitants.

In Spain the passions are the causes of crime; and of 5,400 in a year above 3,000 are for murders.

The aqueduct of Segovia still exhibits 129 arches. That at Versailles is three miles long and half a mile high, with 242 arches in three stories.

Portugal contains 22,765,000 acres, and the population amounts to 4¾ millions. It produces about 80,000 pipes of red port, and 60,000 pipes of white wines per annum; but, owing to bad government, and the ascendancy of priestcraft, it is the feeblest, poorest, dirtiest, and least respected country in Europe.

The revenues of Portugal were, in 1828, about 1½ millions sterling.

Switzerland contains 22 cantons, and nearly 2 millions of inhabitants. Berne, 300,000; Zurich, 182,000; Vaud, 142,000; and St. Gall, 130,000; Zug and Urlbut, 14,000 each. The cities of Basle, Geneva, Berne, Zurich, and Lausanne, contain 16,000, 22,000, 13,000, 11,000, and 10,000. The other Swiss towns are but villages.

Chamouni is a valley in the Alps, 3,300 feet above the level of the sea, 18 miles long, and shut in on each side by Mont Blanc, Mount Breven, and Montanvert, rendered highly picturesque by their astonishing elevation, and by the glaciers or masses of frozen ice which cover the sides of the mountains and fill up the valley.

Italy, so interesting as the native seat of those organized freebooters who, 200 years before the Christian æra, overran the world, is in the best climate of Europe, and divided by nature into four parts: I. The plains of Lombardy, watered by the Po; 2. The ridge of the Apennines, which divides Italy into two sides; 3. The plain between the Apennines and the Mediterranean, in which Florence, Rome, and Naples are situated; and, 4. The plains between the Apennines and Adriatic.

The Grand Duchy of Tuscany is equal in extent to Wales, and contains about two millions of inhabitants. The duchies of Parma and Modena are each equal to Devonshire, and contain about half a million inhabitants.

The Campagna di Roma is 45 miles wide, and altogether volcanic. Mount Cavo is 3,000 feet high, and has a crater, and there are two other craters in the district, which is very fertile; but the Pontine marshes are very unhealthy and dangerous. The country being monopolized by large proprietors, there are few farm-houses.

Rome, which used to boast of five or six millions of inhabitants, now contains not more than 140,000, and a fourth of these are foreigners. Other cities, which used to contain 100,000, are reduced to half, and in some cases to an eighth. The agricultural population has, on the contrary, increased. For want of currency, rent is generally paid in kind, and the proprietor takes half the produce. The monopoly of land exists chiefly in the Roman States, but in Tuscany and Lombardy the *Possidenti* are very numerous. The mass of the people in the Neapolitan and Roman states are in a condition of squalid poverty; but, under the wiser government of Tuscany, the condition of the people is gratifying.

The population of Rome, in 1829, was reduced to 144,541, which included 35 bishops, 2,500 priests, 1,390 nuns, and above 30,000 foreigners.

Palermo in Sicily, in 1817, contained 80,000 inhabitants. The whole extent of Sicily is 12,533 square miles; and, though the garden of Europe, its revenues are only 200,000*l*.

Turkey in Europe, without Greece, is about the size of the United Kingdom, containing about five millions of inhabitants, but its Asiatic provinces contain another fifteen millions.

Constantinople—in situation between the Black Sea and the Archipelago, and in climate 41.1°, is the finest in the world. It is built on seven hills, in the form of a triangle, the obtuse angle being on the water side. Its north side is bounded by a fine harbour, and the south side by the Sea of Marmora. It derived its name from the Emperor Constantine, who enlarged Byzantium; and the Turks call it Stamboul. It contains nearly half a million of people.

Mahmood, the present Turkish Sultan, has changed the dress of all his subjects and soldiers to the European fashion.

The Albanians occupy a tract 250 miles long, and 100 broad, on the east of the Adriatic. Their numbers are about two millions. They are the best soldiers of Greece, and delight in arms.

The produce of Greece, as to vines, grain, and fruits, resembles the south

of France, but figs and olives are more abundant, and cotton is grown to considerable extent. The country has been so long oppressed, that the people of the towns and coasts are reckless and vicious.

The modern Greeks are estimated at about 3 millions, mingled with one million of Turks, Jews, &c.

Travelers agree in describing the modern Greeks as possessed of all the vices, without any of the virtues of the Turks, and as the dregs of christianity.

The island of Candia, south of the Archipelago, in latitude 35 deg., is 180 miles long, and from 12 to 15 broad. It is intersected by a chain of mountains, covered with snow for two months in winter; but, the climate is so mild as to require no fires. It never rains in summer, but the dews make it very fertile. It has been famous through all ages for its salubrity and its luxurious and pleasing productions. Many mythological fables refer to it under its ancient name of Crete. Jupiter was born here, and Mount Ida is situated in it. The aboriginals still retain their independence in the mountains, but the Turks disgrace the coasts by their superstitious oppressions and indolence. Every one is obliged to appear poor to avoid the extortions of the pachas. It exports oil, wine, honey, fruits, and soap. It was the site of murderous wars between the Venetians and Turks; and Candia, the chief town, was at last taken, in 1670, after a siege of twenty-four years, in which perished 30,000 Christians, and 100,000 Turks.

Corfu, so celebrated in mythology and poetry, and for some years under British administration, is about 50 miles long and 25 broad, with 60,000 inhabitants. Its climate is not genial, and its soil not fertile. Its staple is olive oil, and there are many million trees, which produce fruit every other year, and cause an export of nearly half a million of useful oil. Some wine is also made.

Zante, twenty miles in diameter, yields from 60 to 70,000 cwt. of currants, at 16s. per cwt. The other Ionian islands yield as much more.

The seven Ionian Islands contain about 200,000 inhabitants.

The grotto, or cavern, in the isle of Antiparos, in the Archipelago, is 1,000 feet long, 300 broad, and nearly 200 feet high. It is filled with white transparent stalactites. Its real extent has been unexplored. The island is calcareous.

The countries of Asia, formerly the most populous in the world, have, by misgovernment, been so reduced, that Syria now contains but 1½ million; Armenia but ⅘ million; and Chaldea nut 50,000; Babylonia about half a million; and Mesopotamia about half a million. The northern parts of Syria contain about half a million; ancient Phœnicia not more than 50,000; and Pontus about 150,000.

China is the vast tract which lies in the south-east of Asia; and being separated from other countries by impassable mountains or extensive deserts, has preserved its independence, government, and distinct national character, through an indefinite number of ages. It is about 1300 miles long, and 1200 broad, connected by some of the largest rivers in the world, and by innumerable canals. The Chinese name for the country is *Tchongkoué*. It is divided into fifteen extensive provinces, and abounds in very large cities: Pekin, in lat. 39° 55′ north, being the residence of the emperor, and one of the largest and most populous cities in the world. It is surrounded by walls thirty feet high, and about twenty feet thick, which enclose an area of twelve miles, besides extensive suburbs. The province of Tche-kiang contains eleven cities of the first class, and ninety of the third; and produces a large proportion of the silk, of which great quantities are consumed in China and exported to Europe. The province of Nankin contains the city of that name, the walls of which are sixteen miles round, and was till within two centuries the capital of China. The Chinese assert that the fifteen provinces contain 4300 walled cities, besides 3000 towns, and villages innumerable.

China contains 1,297 991 square miles, with a population of 150 to every square mile, having had the advantage of a paternal government without religious superstition for 4000 years.

Mr. Morrison states the population of China to be about 146 millions; and Grozier makes it 157 millions. China contains nearly a thousand millions of acres, of which about two-thirds are cultivated. The imperial revenue is derived chiefly from a land-tax of 10 per cent., taken on every moo, or about five roods, and collected on 600 millions of acres.

Rice is universally cultivated, and is the staff of life. Large tracts are covered with white mulberry-trees; other tracts are covered with fields of cotton. The tea plant abounds in some districts, but is cultivated in every garden and farm. Their candles are made from the berries of a tree, and they universally burn this wax, which is fragrant, and yields a bright light;

Other candles are made from vegetable tallow, the product of the croton sebiferum. From the berry of the tea-flower they make excellent salad oil. Tobacco is universally cultivated.

Grafting is very ancient among them, and they cut off prepared branches of fruit-trees, and successfully plant them in pots. They also cultivate the sugar-cane, and the fruits and vegetables of every climate. They are strangers to the use of milk, butter, and cheese.

Their rivers and canals are so numerous and navigable, that the imperial boats alone are ten thousand in number, for distributing to public granaries the produce received in kind as taxes. Some writers have supposed that half as many live on water as on land.

The Chinese consider all employments subordinate and degrading, compared with the culture of the land: hence, two-thirds of the population are engaged in husbandry, instead of one-third as with us.

In their domestic establishments the Chinese are the neatest, cleanest, and most comfortable people in the world; and their customs and manners appear to have been unvaried for many thousand years. Virtue and learning are zealously promoted by the court, and specially honoured by the religion and habits of the people.

The wise policy of the Chinese is in nothing more perceptible than in the government receiving the greatest part of the taxes necessarily imposed in the produce of the country. This relieves industry from the intrigues of money-dealers and usurers. The landlord, also, is paid his rent in the produce of his farms; and the farmer again pays his labourers by an allotment of small portions of land, from which industry, with a little occasional encouragement, derives comfortable subsistence.

Traders and merchants are ranked amongst the lowest class, or as persons who will cheat as often as they can, while the high interest of money destroys them.

The policy of the government encourages home-trade only, and discourages all foreign trade as unnecessary; for they regard all foreigners as barbarians, and their own country as a celestial empire, specially protected by heaven. The Russians, however, trade with them from Siberia, by means of caravans, but it is very limited, and under strict controul. The chief trade in Chinese vessels is with Japan and the oriental islands. The European trade with Canton is carried on partly by sufferance, and partly by the interest of the city of Canton at court. Besides porcelain and tea, the Chinese export silk, gold, quicksilver, tuteneg, nickel, various drugs and nankeens; and they import tin, lead, cotton, broad-cloth, silver, glass-ware, watches, &c. Their engravers, particularly on ivory, are highly ingenious, as in their fan-mounts, models of buildings, and hollow globes, one within another, fifteen in number.

Canton, the city and port of China, with which Europeans are allowed to trade, stands on the north side of the river Bocca Tigris. It is enclosed in a wall above six miles round, and no European is permitted to enter. The suburbs are more extensive. The European factories are situated on a quay on the banks of the river. The British are both extensive and splendid. Above Canton is a Boat Town, in which it is supposed a population of 300,000 pass their lives. Forty millions pounds of tea are exported, besides silk and other staple articles; chiefly paid for in silver. European vessels are not permitted to ascend higher than Wampoa, twelve miles below Canton; and Chinese junks fetch and return the cargoes. The country around is beautiful, and highly populous. It is in latitude 23° 7′ 50″, or 20′ within the tropic of cancer. The thermometer ranges between 50° and 90°.

The emperor of China is the father and mother of the people, the high-priest of heaven, and the fountain of all honour, power, and wisdom.

The Chinese have no sabbath-day*, no congregational worship, and no external forms of prayer or devotion. The emperor is their mediator with heaven; and at the equinoxes he offers sacrifices and oblations with great form and ceremony, preparing himself by fasting and humiliation, and by acts of grace and benevolence to the people. Their religion ascribes to God all the usual attributes of divinity. Their superstitions arise from a belief in spiritual agents, or angels, good and bad, who preside over and interfere with every thing. From this cause, their temples are full of images personifying these spirits, and oblations are constantly made to them by the people, by which the priests profit. They also believe in astrology, magic, witchcraft, and alchemy. The two sects which divide the population are those of Tao-tse and the followers of Fo, who resemble the Hindoos, and have innumerable temples. Some emperors encourage one, and some the other. The religion of Tao-tse commenced about 15 B. C. and the other about the year 60 A. D. The religion of the court and magistracy is that of Confucius, with a leaning to Fo.

The northern parts of China are subject to earthquakes. In 1079, 300,000 people in Pekin were buried, and 80,000 in Tongtchoo. In 1730, 100,000 inhabitants of Pekin perished, and 80,000 in a suburb village. The earth opened, smoke issued, and pools of water were formed.

The Pekin Gazette, published by authority, is, by law, read every where.

The population of China is supposed to be about 300 millions, most of whom live in plenty; but there are no overgrown feudal nobility.—*Macartney*.

The imperial colour in China is bright yellow, but the nobles and mandarins wear violet. The people are divided into mandarins, soldiery, literati, bonzes or priests, husbandmen, and merchants.

The Chinese mandarins, or magistrates, are removed to a new district every three years, and they cannot marry in the district which they govern; if a robbery or murder is committed, and the perpetrator not discovered, the mandarin is removed. There are nine orders of them, amounting for civil purposes to 10,000. The number of military mandarins or officers is upwards of 15,000.

The revenues of China, in sterling money, are about 32 millions; and the public expences are about 23 millions, which includes 842,000 soldiers, and about two millions to the mandarins.

The Chinese still use bows and arrows and match-locks.

There was a Cyclopedia of Arts and Sciences published in China, by authority of the Emperor Kien-long, with numerous engravings.

They make spectacles of rock crystal. Most of the purposes of their arts, founded on the general wants and passions of human nature, have similar objects to those of Europe, but their means of obtaining them are generally very different.

They have a sort of Adrian's wall to shut out the Tartars, built about 200 years B. C. in about five years. It begins at the Yellow Sea, and terminates at the city of Kin, near impregnable mountains. It crosses rivers, valleys, marshes, and mountains. It is 1500 miles long. The wall is double, of brick or stone, and filled up with earth; the top is paved with flat stones, and so broad that six horsemen may ride abreast. In valleys and plains it is thirty feet high, and provided with towers at the distance of bow-shot from each other. It is the greatest monument of human industry in existence.

The grand canal is another wonderful performance; it is older than the great wall. It is called the Yu-Ho, and was completely finished about the year 1400. It is 900 miles long. In some places it is cut 60 or 70 feet deep, and in others is carried across valleys at a considerable elevation. The whole is lined with stone, and secured by strong embankments.

In toys, and fine mechanism, the Chinese are highly ingenious, and imitate with readiness the most curious productions of European workmen. They make little or no use of machinery; but it is constantly discouraged by the government as interfering with the subsistence of the people. The arts of Europe which have been carried to perfection in the last century, were as perfect in China 1000 years ago as in Europe now. The common people were clothed in silk, while the people of Europe wore woollen cloths, as coarse as blankets. The Chinese ladies enjoyed a superb toilet and costly trinkets, while wooden skewers were used instead of pins; and when oats and turnips were first grown in Europe, China enjoyed luxuries of our improved horticulture. If Europe has excelled them, it has been chiefly by imitating them and the Hindoos.

Small oblique eyes, high cheek-bones, sharp chins, large ears, thickish lips, and black hair, are the general characteristics of Chinese men and women. With some good qualities, they are dirty in their persons, use no soap, seldom wash themselves, never bathe, seldom change their linen, and commonly sleep in their clothes.—Hence they abound in vermin, and destroy them by eating them. They are cheerful, obliging, mild, and timid. Women are much degraded among them, and as a peculiarity, to make them keep their houses, they bandage their feet so that they will go into a shoe 4 inches long and 1½ broad.

Newspapers are printed at Pekin. Almanacks and predictions similar to those of the Stationers' Company, and a great variety of useful and amusing books, are constantly published at Pekin. Children, in general, are carefully educated, and learning is no where held in higher estimation; at least two-thirds of the people are qualified to read and write. Their poetry is a sort of sentimental prose. Kien-long was a poet, and the following specimen has been published as his on the making of Tea: " On a slow fire let a tripod be set, whose long-use is shown by its texture and colour; with clear snow-water fill it, and boil it sufficient to make cray-fish red, then throw it upon the delicate leaves of the tea in a cup of Yooe; let it remain as long as vapour rises in a cloud and

leaves only a mist on the surface. This precious liquor will chace away the five causes of sorrow; we can taste and feel, but not describe the state of repose which it produces."

In coming up the river to Canton, a stranger is completely absorbed in contemplating a scene, without a parallel in any other country. When he has just escaped from the confinement of a ship, the beautiful scenery and luxuriant appearance of vegetation is delightful beyond measure; added to this, the extraordinary sight of the multitudes of boats, vessels, and craft of every description, swarming with the water population, contributes to amuse and astonish him.

The factories occupied by the European residents at Canton, form a range of perhaps eight or nine hundred paces in length, and extend, to a Chinese cross-street behind them, various distances from four to six hundred feet.

The large Chinese junks are curious specimens of depraved taste in ornament and misconceived ideas of the form and character of the requisites of a vessel calculated to sail swiftly and securely. They are built with considerable curve or sheer, as it is termed by sailors, and sit upon the water like huge half-moons. A great beam in proportion to their length, and a very full build, added to numerous projections of timber heads, &c. from the sides, are all calculated to retard their progress through the water.

The sails are of matting, sometimes having a topsail of coarse cloth. Trading junks are not permitted to carry guns, and the only arms with which they are provided are pikes, halberds, and sometimes swords. In size, they vary from near 1,000 tons to 40 or 50.

The boats used for the inland transportation of merchandise on the canals, are built in a peculiar manner, and are many times larger than those of Europe or America, the largest being estimated at four to five hundred tons burthen, and having a crew of forty or fifty persons. They are constructed like long narrow scows, drawing six or eight feet water, and having covered cabins or holds, the roofs, or covers, about six feet high, and rounded on the top; on this, supported by cross pieces, which rest on lateral uprights, are placed boards, which form the real deck. These boats come to Canton in considerable numbers, laden with tea, raw silk, and other articles of export which are raised in the northern provinces, and return with cargoes of salt, skins, and foreign dry goods.

Foreigners are particularly struck by the narrowness of the Chinese streets. In Canton, the widest of them certainly does not exceed one of our lanes, and the mass of people which constantly fills them renders the passage difficult and disagreeable. The pavement consists of slabs of granite placed transversely, and cut roughly on the surface, to prevent slipping in wet weather. Boards are mostly thrown across from the roofs on each side, by which means the rays of the burning sun are in a measure excluded. There are no side-paths, or trottoirs, as wheeled carriages are never seen in Canton, and no horses, except those belonging to the military. Scavengers are constantly employed in removing dirt, which collects in great quantities; but, in spite of their labours, the streets are disgustingly filthy, and abound in the most abominable smells; especially in the rear of the factories, and near the butchers' and poulterers' shops.

The means in use among the Chinese for producing an impression of letters, appear to be nearly the same with those invented in the infancy of the art. Blocks of hard wood, or masses of metal, forming a kind of stereotype, are printed from, by a very simple and expeditious process, and solely by manual labour, as presses for the purpose are entirely unknown. The Canton Gazette, a kind of court-journal of appointments, arrivals, and departures, is one of the few publications which are printed from moveable types. The blocks which are mostly used for engraving these stereotypes upon, are made of a hard and well-seasoned wood, divided into slabs, in the direction of the grain. The subject to be engraved is carefully written or drawn on thin paper, and pasted reversed upon the board; the wood is then cut from around the characters, and the letters remain in low relief. The appurtenances of a printer are very simple and cheap, and the operations less complicated than almost any other mechanical process. The board or slab of wood is placed on a table before the workman, and a pile of dry paper cut to the proper size, at his side; when, with a rude bamboo brush, a coating of liquid Indian ink is put upon it, a sheet of paper is then placed on the top, and the impression completed by rubbing it over once or twice with a kind of vegetable fibre. The sheet is then lifted off, and the process repeated with the next. The paper is very thin, and is only printed on one side; the sheet is folded with the blank side in contact, and the two edges are bound into the back of the book, making it resemble a volume, the leaves of which are uncut; the paging,

&c. is on the external margin. In this simple manner, all books and engravings on wood are printed, and a skilful workman is able to produce the impressions with as much celerity as our own, with the use of the press. Adjoining the room in which the printing is performed, is another, filled with racks, or open cases, on which the blocks are arranged in regular order. Every block contains matter for four pages, so that the number, and bulk of the set composing a voluminous work, is very great.—The price of books is low, and there are numerous book-shops and stalls in all the principal streets. The binding is merely soft paper, and the title is carefully written on the edge of the bottom leaves.

Females in China do not hold that rank, or enjoy those privileges which, in more cultivated nations, are conceived to be their due. The Chinese women are generally very ignorant, their instructions being principally in domestic affairs. A learned lady is so uncommon, that her attainments are a theme of admiration; she is immortalized in odes, and her fair resemblance magnificently illuminated on fans, screens, &c. for the admiration of posterity. The poorer classes are engaged in various menial offices, while those of rank employ their time in music, *smoking*, and *other accomplishments*. A lady of fashion is of course supposed guiltless of any manual labour, and consequently the nails are permitted to acquire an enormous length, particularly that of the little finger. These ladies smoke much, and their pipes, usually formed of slender bamboos, the bowl of silver, or white copper, and mouth-piece of amber, or valuable stone, are in many instances singularly elegant. The pieces of bamboo used for the stems, are valuable according to the regularity and beauty of the wood, the evenness of the joints, and clearness of the bore. For those in which these various excellencies are in great perfection, high prices are given. Music is a favourite recreation, and guitars of various kinds, with other musical instruments of extraordinary shape and tone, are indispensable appurtenances to the boudoir of a Chinese belle. In such trifling employments, the life of these imprisoned beauties glides away with little variation, while that of the lower classes is one perpetual scene of labour and exposure. They perform not only all those offices which are assigned to them in other countries, but on them and their children principally devolves the task of navigating the multitudes of small boats which cover the Chinese rivers.

The custom of compressing the feet, which has so long been supposed to originate in the jealousy of Chinese husbands, is, in reality, but in imitation of a certain queen of China, who, being ordered to bind up her feet in the smallest possible compass, to please the fancy of her lord, was of course immediately imitated by the ladies of her court, and it thus became a standing custom. The size of these curious feet varies from four inches to the usual length of the female foot: for in some, from carelessness, they have no impediment presented to their growing in length, and are only very much compressed. Those on which the bandaging has been carefully performed are scarcely any longer than when first confined. The toes are turned under the sole, and the point of the foot is terminated by the great toe, which alone preserves a resemblance to the original form.

Terrace cultivation is not so common in China as the mendacious missionaries have represented.

It is impossible to travel through the Emperor of China's dominions without feeling that he has the finest country, within an imperial ring-fence, in the world.—*H. Ellis.*

Cochin China, containing ten millions of inhabitants, is remarkable for having neither priests nor religion of any kind. The government is despotic, but the people are industrious, just, and orderly.—*Finlayson.*

Among the officers of the Chinese government, unknown in Europe, is an inspector of schools, an inspector of salt-works, an inspector of ports and navigation; another of highways, another of rivers, and another of coasts.

INDIA is divided into territories, under the presidencies of Bengal, Madras, and Bombay; into states dependant on them, as Sikim, Oude, Cutch, Rajpoot States, Bhopal, Madiva, Gujerat, Hyderabad, Berar, Mysore, Travancore, Assam, &c. and into several independent states.

The coast called the CARNATIC, in India, is a plain which extends to the Ghaut Mountains, which soar above the clouds in a chain 8 or 900 miles long, nearly north and south. The Carnatic is also called the Coast of Coromandel, and it has no harbours, and a very dangerous swell on the beach; yet Madras, Pondicherry, and Cudalore, stand on this coast; and Madras is a very large city, called the Black Town, with numerous English residents, who reside in Fort St. George. The staple grain is rice; but sugar and cotton are also cultivated. The roads are good, and well supplied with *choultries* or taverns.

The districts of every Hindoo state contain about thirty villages, under a zemindar or mundloe. His revenue is paid in kind, and under him are a register and land-measurer. Every village is under a polail, and there is a pursau, or priest, and chou-keederop, or watchman. Every village has also a carpenter, blacksmith, barber, and washerman. The ryot, or farmer, paying all these, has abundance for himself. There are private schools in every village.

The Hooly festival, or carnival, in India, lasts four weeks; and, during this time, restraints and distinctions are laid aside, and care and labour forgotten.

Female slaves are common; but there are few male slaves.

Witchcraft is universally believed; and is referred to old women, as in Europe, and they are exposed to similar ordeals. Numbers are thus sacrificed to popular superstition every year, and it is dangerous to interfere with that or any other principle of their faith.

Many Hindoos exhibit, in trying circumstances, traits of heroic virtue and romantic self-devotion unrecorded of any other people. Malcolm's and other histories abound in splendid anecdotes of this kind. No people possess more good qualities and all more bad ones. The first European settlers are the greatest monsters recorded in their chronicles.

The Pindarrees are Indian cossacks.

The Mahomedans, in India, are to the Hindoos as 1 to 22.

The Marattas, under the Scindia family, have become a settled people, and their sovereign, Maha Rajah, was, in 1828, a youth of twelve, with a queen regent. They are the most warlike and active of all the Hindoo races, and least enervated by luxury.

The district called the Circars, in India, is part of the coast which extends from the Carnatic to Bengal, 475 miles long, and 50 or 60 broad. The domestic economy of the people is singular; they inhabit villages, and all labour is performed by public servants, paid from the public stock.

Bengal, the centre of the English empire in India, is 500 miles from east to west, and 300 from north to south. It lies between 21½° and 26½° north latitude, and 86° to 93° east longitude. It is very unhealthy to Europeans; half of the new-comers die every six months, chiefly of bilious and nervous diseases. The thermometer in the spring months varies from 90° to 110°, and from June till October it rains incessantly. The Ganges passes through it, and forms an extensive delta, called the Sunder bunds, filled with wild beasts, and covered with woods. The Ganges overflows like the Nile, in July and August, covering a surface of 100 miles wide. In consequence, the country is very fertile, and much rice is grown. It abounds in wild and ferocious animals, and the Sunder-bunds produce the royal tiger of Bengal, of enormous size, being four or five feet high, and leaping fifty or sixty at a spring. The kindness of the Hindoos occasion birds to be familiar in the houses. The number of native inhabitants is about twenty millions, of which sixteen are Hindoos, and the remainder Mahomedans. The Hindoos are dark brown, and the others olive.

The HOOGLEY, on which stands Calcutta, is the most westerly mouth of the Ganges, and 150 miles from the principal entrance of that vast river. It joins the main stream 250 miles above Calcutta, and Calcutta is about sixty miles from the debouche into the Bay of Bengal at its north-west corner. It was but a village in 1690, when Charnock, the Company's agent, fixed on it as the seat of a fort and factory, twenty miles below the former factory at Hoogley. It has now grown into a first-rate city, containing about half a million of inhabitants. There are an European quarter and a black quarter very populous, while the other is very magnificent. The whole extends above three miles on the banks of the river. From the town to Fort William, a quarter of a mile, is an esplanade; and west of this is the house of the governor-general, equal to any palace in Europe. European, Armenian, and Banian merchants, make immense fortunes; and the former live in princely style. But the situation is fatal to British constitutions. It is in latitude 22° 33′ north, and 88° 28′ east longitude; about 1200 geographical miles from Delhi, 1500 from Bombay, and 1100 from Madras.

Bombay, a flourishing English settlement in 19° north latitude, and on the western coast of India, is built on an island, seven miles in diameter. It contains from 150,000 to 200,000 inhabitants, of all religions. The climate is not healthy, and during four months it is exposed to the rains of the monsoons, so that in June 45 inches fall, in July 30 inches, in August 19 inches, and in September 11 inches, making 105 inches, or three times the quantity that falls in Great Britain in 12 months. The same proportion generally prevails throughout India.

The Banians are the mercantile *caste* of the original Hindoos. The other

three castes are the priests, the soldiers, and the working artizans. They call themselves *Shudderies*, which signifies innocent and harmless. As they believe in transmigration, they never kill any thing, nor eat of any thing that has been alive, while they relieve and assist every animal in distress or difficulty, including even the most noxious, and having institutions to cure their injuries. Purity is so essential to them, that, if touched by a Mahomedan or Christian, they undergo ablution; and never drink out of a vessel which has been used by such. They are the wealthy merchants, bankers, and brokers of India; and they are as remarkable for their integrity as for their kindness and humanity.

Balkh, in Bactria, is believed in Asia to be the oldest city in the world, and is called the Mother of Towns. It is still a considerable place, with colleges, &c.

Banian is the name of a city in Great Bucharia, held in great veneration by the Hindoos as the fountain of Buddhaism. They say it was built by Sham, who was an incarnation of Vishnu. It is cut in a mountain; and there are 12,000 recesses or habitations, some very large. Near it are two statues 80 or 90 feet high, and another 20 feet high, called Schahama and Salsala; but the Mahomedans call them Adam and Eve and Seth. The Hindoos believe that they bleed if wounded; they also call it the Stone City, it being so ancient that previously men lived in huts and caves.

Delhi, a famous city in India, was the capital of the Mogul Empire. It is now in decay, but in 1700 it contained a million of inhabitants. It is in lat. 28° 30′ and east long. 77° 40′.

The colonization society of Bengal estimate the building of ten houses, with mud walls and out-houses, at 1000 rupees; pairs of bullocks at 25 rupees, and the rent of one thousand beegahs of ground at 1250 rupees; with the subsistence of a family for a month, at 40 rupees, each rupee being 2*s*. 4*d*.

In India and the East dancing-girls are trained, called Almeh, and they give a fascinating entertainment called a *natch*, for which they are well paid.

By reports published by the East India Company, and Bishop Heber, it appears that great distress has been created in India by the introduction of machine-made fabrics; and that European cultivators live in great hostility with the natives. The Hindoo castes prescribe employments which machines supersede, and the same castes cannot seek other employments.

A modern German statician asserts, that JEDDO, in JAPAN, is the most populous city in the world, and assigns to it 1,680,000 inhabitants.

To Pekin	1,500,000
London	1,300,100
Hans-Ischen	1,100,000
Calcutta	900,000
Madras, Congou-Ischen, and Nankin	800,000
Paris	717,000
Weist-Chuna	600,000
Constantinople	597,000
Benares, Kio, Su-Ischen, and Houng-Ischen	500,000

The Japanese, warned by the fate of India, in permitting the encroachments of Europeans, sturdily resist every overture of the Russian and other governments, to trade or hold the slightest intercourse. They permit the Dutch to send two or three ships to Nangasaki, under restrictions and privations of the most humiliating character. They trade with the Chinese and these with them, but they shut out all who unite the plausible objects of trade with thirst for domination. The Russians returned, in 1792, some shipwrecked Japanese; but no intercourse was permitted, and they were told to take them away again if the return implied obligation. In 1803 the emperor of Russia sent his chamberlain, as ambassador, with presents, but they declined to receive either. Soon after they seized on Captain Golowin, and some sailors, who had landed, and kept them two years in strict confinement. In 1810 the English frigate Phaeton experienced some civilities, for which five Japanese lost their lives as criminals.

The Japanese permit but ten Chinese junks to enter their ports in a year, but these make two voyages.

Ceylon, between 6 and 10 degrees north, is 280 miles long and 160 broad. Trincomalee, the finest harbour in the world, is now occupied by the English, who also direct the government of the island, at Candy. It produces cinnamon and other spices, with all other products of the East; and is so fertile, that the natives claim for it the seat of Paradise. Their king and his numerous subjects long resisted the unwarrantable intrusion of European adventurers. On the high moontain, called Hamalel, they show the impression of a human foot, which they allege was that of Buddha when he ascended into heaven about 600 B. C. High mountains divide the island into two sides, which experience opposite monsoons. The king resides at Candy; but the principal town is Columbo. The island yields a profusion of precious stones, with lead, tin, and quicksilver.

Ceylonese elephants are celebrated,

as well as its serpents and ferocious animals. There is also a pearl-fishery; the oysters are nine inches round, and the pearls are in the fleshy part of the oyster. At seven years old most of them yield many pearls. The season is in February, lasts 30 days, and employs 150 boats, each with 10 divers, who hold their nostrils with their left hand, and remain about two minutes under water, and some double that time. Water and blood issue from their mouths, ears, and nostrils; but they dive 40 or 50 times a day. There are sharks, but these are driven away by conjurors! Sometimes the divers swallow the pearls; but, if suspected, purges and emetics are administered. The station is called Condatchy, and is much resorted to in the fishing season.

The population, called Cingalese, is about a million and a half; rather amiable in character, and, as Baudhists, very temperate. They chew betel-leaf, which stains their teeth black. The religion of Buddhu emanated from Ceylon. By some he is treated as a divine personage; by others, as a good man of divine character, who, after performing many miracles and good actions, ascended into heaven, where he acts as mediator with the Supreme for pardon of his worshippers in a future state.

The trees which cover Ceylon are the jack, the bread-fruit, the jamboo, the cashew, the areca, and the invaluable cocoa-nut. The underwood is the black pepper, betel, coffee, cinnamon, tobacco, cotton, &c. &c. It is called the Garden of Asia, but unhealthy, owing to the density of its forests. It is the Holy Land of Bhaudism, and by Ptolomy was called Taprobana. Its local name is Singhala, the Lion begotten; Companbo, its English capital, and a sea-port, contains 50,000 inhabitants. The thermometer ranges from 86° to 73°. Trincomalee has the finest harbour in the world.

The subdivisions of castes in India are 84. Wilks thinks the degraded castes are the aborigines, subjected by invaders. The Pooleahs of Malabar are outcasts, whom Brahmins or Nairs destroy as wild beasts, and in consequence (says Forbes) they have scarcely the human form. The Pariars are still lower, and their touch would defile even a Pooleah! The Molungres, or salt-boilers, in the Sunder-bunds, are lower even than the Pariars!

The castes who eat flesh are guilty of greater atrocities to animals even than are practised in Europe. One caste eat entire sheep alive.—*Forbes.*

Corn is ground in India by women with hand-mills.

Indian gardens are made to resemble a Turkey carpet.

At Haridwar, in Northern India, is an annual fair, the mela, and a pilgrimage, and every twelve years a festival. From two to two and a half millions attend from every part of India, to make ablutions in the Ganges, &c. which rises thirty miles distant, near Gangoutri, in lat. 31° north.

Java (says Raffles) is 660 miles long, and contains 50,000 square miles. Madeira north-east, separated by a narrow strait, is 90 by 30. It is divided into the native dominions of an emperor, who resides at Sura-kerta, and of a sultan, who resides at Yugya-kerta. Its mountains are from 5 to 12,000 feet, and volcanic. No granite is found, but quartz and feldspar are common. The soil is rich and deep, and the seasons wet and dry. The thermometer between 67° and 90°. It is healthy, but the Dutch Swamp at Batavia killed 50,000 per annum. It produces abundance of rice, maize, sugar, coffee, pepper, nutmegs, cloves, &c. &c. The people are yellow, with Tartar physiognomy and mild Hindoo manners. The population is five millions. The Dutch are hated as cruel oppressors. Chinese bugis, from Celebes and Malays, fill their ports. Among their native works is the Breta yudha, or War of Woe, written in 1079, and full of splendid passages. They were Boudhists till 1475, when conquest made them Mahomedans.

Bejapour, a city in the part of India called the Deccan, one of the largest in Hindoostan. It formerly contained nearly a million of houses, and 1600 mosques and temples. The great mosque of Adilshah, built about 1660, is about 500 feet long and 240 broad; and the mausoleum of the Shah is 153 feet square, and 100 feet high. There is also an older mosque, built in 1620, 390 feet long and 160 broad, which employed 6500 workmen 37 years. Benjapour abounds in other magnificent structures. In its forts are three wonderful pieces of cannon, from 14 to 30 feet long.

Prince of Wales's Island is an important English settlement on the west coast of Malacca, fifteen miles long and one and a half in breadth. It has a fine harbour, and had become a central position, till it was superseded by Sincapore, now the *entrepot* of the Chinese and Indian Seas.

The Banda Islands, so famous for their growth of nutmegs and mace, are ten in number. One of them, Gonang-Api, is famous for its immense volcano, 2000 feet high, which is always burning, and sometimes covers

the neighbouring sea with its ashes. The Dutch East India Company engross the spice trade, and permit the cultivation of the nutmeg only in four of the islands, in which the people suffer the most cruel oppressions from their Dutch task-masters. The tree bears fruit from 10 years old to 100; the leaves resemble the laurel; the flowers are white, two or three on a peduncle. The nutmeg proceeds from a reddish nob in the centre of the flower, but not more than one-third ripen. The fruit is the size of an apricot, pear-shaped. When ripe, it opens and displays the nutmeg in a black and shining shell, enclosed in net work of scarlet mace. The shell is like that of a filbert; it is dried with care, and when the nutmeg shakes in it, it is broken, and the nutmeg soaked in sea-water and lime, to preserve it from insects. There are three sorts, the wall-nutmeg, the royal, and the green. About 100,000 lbs. are exported and sold in Europe, and 50,000 are sold in India. In the three years in which the islands were in possession of England, they yielded about 84,000 lbs. per annum, at 10*s.* per lb.; and 40,000 lbs. were sold in India. During the English possession, from 1802 to 1805, the quantity of mace was 8000 lbs. per annum; and 1800 lbs. for India, at about 45*s.* per lb.

If we consider New Holland as continental rather than islandic, then Borneo is the largest island, it being 780 miles long and 720 broad, or nearly circular. No country is less known, though there are factories on its coast; but the people are barbarized by superstition and priestcraft, partly Mahomedan and partly idolatrous. The Emperor resides at Baryar-Massin, a city built of bamboos, of which material the dwellings are of an immense size.

Australasia, a fifth division of the Earth's surface, includes the continent of New Holland, Van Dieman's Land, New Guinea, New Britain, New Zealand, &c. mostly discovered within two centuries. New Holland was first visited at Hartegh's Island, in 1616, by a Dutch vessel; and afterwards explored by others of that nation. Tasman discovered Van Dieman's Land and New Zealand in 1643. De Menzes discovered New Guinea in 1526. Dampier discovered New Britain and New Ireland in 1699. Mendona, in 1567, discovered the Solomon Islands. Roggewein discovered the Thousand Islands in 1722. The Society Islands were discovered by Wallis, in 1765. Cooke discovered New Caledonia in 1774, and the Sandwich Islands, &c. in 1778. Wilson the Pelew Islands, in 1707. Turnbull discovered Phillips's Island (so called by them in compliment to the Editor of this volume;) also Holt's Island, and another. Freycinet discovered Bonaparte's Archipelago and Decre's Island, and Napoleon's Land. Botany Bay and Port Jackson were discovered by Cooke, and settled in 1787.

The native inhabitants of all Australasia, equal in surface to Europe, are not supposed to amount to 100,000.

Norfolk Island, discovered in 1774, is now a flourishing English settlement.

When the independence of North America rendered it inexpedient to transport British convicts there, a plan was adopted in 1787 to transport them to New South Wales; and here settlements have been formed, which, like America, must soon be independent. A cruelty resulted (of which the tribunals and legislature could not be insensible) for seven years transports were sent to this distance, often when three or four years of the seven had expired! Hence thousands, for petty and first offences, have been doomed to pass their lives in banishment from inability to pay 100*l.* for their passage home.

Port Jackson, on the south side of which stands Sydney, is one of the finest harbours, running fifteen miles inward, with various coves and secure anchorage. It is in 33.15 S. lat. and 151° 15′ E. long. It may, of course, be regarded as the nucleus of a future republic at the antipodes, and as opening a vast perspective of future history. About half a million of acres are in cultivation, and the stock of horses, cattle, and sheep is a million and a half. Wool is the great gold mine of the colony, though many who are fond of a vagabond life employ themselves in catching whales and seals, or prefer to live in the bush with the natives. To maintain the monopolies at home every artifice is resorted to, to ensnare emigrants.

Van Dieman's Land is about 120 miles from New Holland; its southern point is a promontory of table land, nearly 4000 feet high. It has two navigable rivers, two fine ports, a rich soil, and in the finest climate from 40° to 45° S. lat. Under a wise and honest local government, it would be a land of promise.

Van Dieman's Land contains about 10 millions of acres of productive soil, more than Scotland, and four or five of sterile. Hobart in the south, and Launceston in the north, are its chief ports.

Hobart Town is on the Derwent, 20 miles from the sea, in the south-west of the Island. The other towns are Launceston, 120 miles distant, New Norfolk, Richmond, Sorell, Brighton, Perth,

Ross, &c. It has mountains higher than Snowdon.

Van Dieman's Land has been independent of New South Wales since December 1825, and it has a representative legislature. It contains 23,000 square miles.

The aborigines of Van Dieman's Land are about 2000 in number, chiefly males, and a plan is in forwardness to remove them, with their own consent, to Gun Carriage Island in Bass's Straits.

From Swan River to Timor is a voyage of 1500 miles; to Java, 1450; to Madras, 3500; to the Cape, 5000; to England, 10,500, performed in 100 days; to Van Dieman's Land, 2000; to Port Jackson, 2400 miles; and to the Isle of France, 3200.

The inhabitants of Van Dieman's Land, when discovered, possessed the art of striking fire with two flints, which was unknown to the inhabitants of New Holland and some other islands in Australasia.

Arabia Petrea, or Stony, is the country which lies to the east of Palestine, and has some mountains; Arabia Deserta extends towards the Euphrates, and is a level sand of vast extent; and Arabia Felix, or Hyaman, or Saba, or Sabeans, is the south-east, lying between the Persian Gulf and Red Sea. The last is populous, fertile, and productive of balsams, drugs, manna, &c. They were the all-conquering Saracens, from 650 to 1300; and the term Saracen is derived from *Sara*, Abraham's wife, for they were otherwise called Ismaelites and Hagarites. Their country never was conquered, being protected by deserts, while they rob all who travel.

Arab tents, which are now as they were three thousand years ago, are pitched in camps, and are under the authority of a sheik, commonly chosen among themselves. They are of black or brown stuff, made of camels' or goats' hair. Each tent is eight or ten feet high, and twenty or twenty-five feet long, with a roof like the bottom of a boat. They are divided by curtains, and at one end they keep their cattle. They arrange their encampment in a circle, put obstructions between the tents, and add to their defence by fierce dogs.

Among the Mahometans, the Arabs and Turks wear beards, because Mahomet always wore his; but the Persians are regarded as heretics because they clip and shave. The Turkish women kiss their husbands on the beard, and men salute in like manner.

The Bedouin Arabs call their tribes the children of the Shiek—as the children of Omar, &c. They are now just what they were in the time of Diodorus Siculus, 1820 years ago. They neither sow, nor reap, nor plant, nor build. For their sheep and camels they receive the products of the country; and they sell for other wants. They range over a country 1800 miles by 1200, with a cloudless sky, and level as the sea, and eat up the pasture where they find it. Settlement and cultivation they consider fatal to freedom; but different tribes inhabit their own districts. They are thin and meagre, and are of the gypsy colour, living to a great age, and being patriarchal in their habits. They are frugal, and even sparing in their diet, and will walk fifty miles without food, and be content with some barley-meal and cold water. They plunder, but never kill unless resisted; and having taken ransom, become faithful protectors, and after confidence reposed, they are never treacherous. They have no literature; but they sing love-songs and tell stories in the manner of the Arabian Nights. It is, however, the native country of superstitions, from Sabeanism, which engendered magic and astrology, to miraculous prophets, whose religions still prevail.

The ruins of Babylon, its observatory to view the heavens, its palaces, &c. are now heaps of stones.

Twelve million lbs. of coffee are annually exported from Mocha and Jedda, in the Red Sea. A bale is 305 lbs.

The Arabians call the camel the ship of the desert. They carry 7 cwt.; and with a pound of food, and a short rest, they travel 15 or 18 hours a day.

The countries in uncertain dependence on Turkey are, in Asia, above 436,000 square miles; the islands are about 11,000; and the African states tributary, but in slight dependence, 276,000. Turkey in Europe, without Greece, is about 80,000; the population of the whole, including Greece, is by different writers estimated at from 23 to 25 millions. The revenue is not more than three or four millions; and Egypt pays its tribute in hemp, oil, linen, rice, sugar, and other products.

Persia generally consists of chains of mountains, extensive deserts partly salt, with rich vallies.—*Porter.*

Ispahan, 200 years ago the finest city in the East, is now passing into rapid desolation.

The part of Syria called Canaan, Judea, or the Holy Land, lies between latitude 31.15 and 33.15, or two degrees, equal to 139 miles, and longitude 34.45 and 36.10, or 60 miles, or about 9000 square miles; being equal to Yorkshire, which is 100 miles by 80.

Jerusalem is scarcely three miles round, and does not appear, from the form of the ground, to have been lar-

ger. On the east is the valley of Jehoshaphat, on the south and west the Valley of Kinnom, in which descend the sides of Mount Zion, on whose surface the city is built. On the north is the Plain of Jeremiah, the only level tract. It is overlooked by higher hills, but Mount Calvary is considerably within the walls, and of a very slight elevation. At this time, Jerusalem is a gloomy and poverty-struck place, and is almost deserted.

Bethlehem is now a small village, six miles south east from Jerusalem. It is famous as the residence of Jesse, the father of David, and as the birthplace of the founder of Christianity. The Empress Helena built a magnificent church on the spot; and a cave is shewn in which the monks say the Virgin Mary hid herself with her child from the wrath of Herod. It now contains about three thousand inhabitants; but, like all this country, suffers under the afflicting oppressions of Turkish pachas.

Damascus, often named in the Jewish histories, was always a splendid city till destroyed by Tamerlane, in 1400. Under the Turks it is the capital of a pachalic, and is by them called Domeschk. It is fifty miles from the sea, and still a fine city, two miles long, and contains nearly two hundred thousand inhabitants. It is a place of great trade, and the rendezvous of caravans and pilgrims to Mecca. The country around it is the most fertile in the world. It is forty-five miles north of Jerusalem.

A pacha, often spelt bashaw, is the governor of a province or city, under the grand seignor. Those who are privileged to carry the tails of three horses in their standards, are called pachas with three tails, and others, pachas with two tails. They are local sovereigns and despotic tyrants; but the courts of law, under the cadi, are independent of them. Their chief duty is to collect and transmit great revenues, and the next object is to enrich the pacha and his family.

The *Janizaries*, or consecrated Turkish militia, the *Spahis*, or horsemen, and the division of the empire into *Timars*, for military service, were all contrivances of Amurath, the fourth Turkish Emperor, who died in 1389 at the age of 71.

The Afghauns, who inhabit the elevated district 500 or 600 miles square, lying between India and Persia, have so strong a Jewish physiognomy, with other Jewish resemblances, that they are suspected to be part of the Ten Tribes, transplanted here by the kings of Persia. Their language, the Pushtoo, abounds in Hebrew words, and Elphinstone asserts that their history refers to Abraham and to Saul, whose grandson was Afgan. They now are Mahomedans and semi-barbarous.

Circassia is the northern part of Caucasus, the tract which lies between the Caspian and Black Sea; it consists of several tribes, and the country is now subject to Russia.

The inhabitants of the Himalayas understand the use of the Catapulta of the ancients, and they practice the smelting of iron after a simple method of their own. Chinese temples and pagodas also prevail.

The surface of Asia also contains Thibet, a large country, of whose reported high civilization little is known. Persia, the prey of dynasties of despots, is now a secondary power, but moderately civilized. Tartary, occupied by varieties of Bedouin Arabs in habits, is a vast region, and little known. All these extensive countries, in the finest climates, are kept in mental slavery by that curse of the human race, superstition and priestcraft. Man is more intellectual than the horses and camels, but not wise enough to emancipate himself and his female partners from the everlasting night created by cunning, idle, and selfish priests.

The district of Tartary, west of the Caspian and Aral, was a few years ago brought under subjection by Sultan Valliami, and the whole now bears the name of Khohani. It includes Bokhara, Balk, and Samarcand, the paradise of Asia, and the primitive seat of science and mythology. The tents of the Tartars have by this sovereign been converted into stone houses and villages. Khokand is a large city, and near it resides, in great state and splendoor, the sovereign of above three millions of Tartars.—*Nazaroff.*

Cyprus, in the Levant, is 200 miles long and 90 in extreme breadth; the soil is fertile, and the climate, lat. 35°, the finest in the temperate zone; but it suffers all the miseries and degradation of Turkish government. Among the ancients it was the seat of pleasure, the birth-place of Venus, and the subject of much poetry. It was an early colony of the Phœnicians, and Pygmalion, Paphos, and Adonis, were among its early sovereigns. In 58 B. C. it fell under the all-grasping tyranny of the Romans, by the agency of Cato, who robbed the people of above a million sterling, with infamous rapacity. About 260 years ago, it fell under the iron yoke of the Ottomans. Mountains divide it, and give it two climates—cool, and hot and dry; and though Dr. Clarke describes it as a wretched destiny of humanity, yet it is considered

as capable of becoming a terrestrial paradise.

AFRICA.

The world has been long mystified about Africa, partly by the craft of trade and religion, and partly by the egotism of European writers of all ages. The Greeks and Romans supposed that as the Equator was approached it became a region of fire. The Egyptian Ptolomy gave the first clear account of it; and as the Carthaginians had sailed round it, tradition gave its true figure in maps long before the pretended discoveries of the miserable Portuguese in the fourteenth century. Since then it has been fenced in by the fatality of climate and the cupidity of slave dealers; but better prospects are rising—steam-boats will navigate its great rivers, and in another century it may be expected to reap some benefit from its fine position in the centre of Europe, Asia, and America. The return of slaves, instructed in the arts of civilized life, will alone work miracles on the population.

Africa being cut into two parts by the great band of sand, called the Desert of Sahara, is like two continents, the north being Moors or tribes with long black hair; and the south, Negro races with woolly hair, covering 35 or 40 degrees of latitude across the entire continent, or from 15° N. to 23° S.

The Barbary coast acquired a partial civilisation from the Carthaginians and Romans, Egypt a splendid celebrity, and Abyssinia a distinction in barbarous ages; but the curse of unrestrained despotism and intellectual slavery so overshadows the whole continent that ages must elapse before the British Colonies at the Cape, Fernando Po, &c. can raise any public spirit in the depressed Africans. The climate, and even the extent of the continent, obstruct both industry and intercourse; and without these, despots will continue to prey with impunity on the tribes whom they misgovern.

Africa is less barbarous than its first visitors, the missionaries and the slave merchants, have represented. One wanted subjects to bait credulity, and the other an excuse for their avaricious and infernal practices. Pastoral simplicity and hospitality under custom are universal. The blacks are not cannibals, and all their great crimes have been excited by the Christian slave-dealers. The bashaw of Tripoli admits that the interior is ignorant, but it appears that peaceable intercourse by caravans prevails through all the interior not disorganised by the avarice of rulers fed and fostered by the Christians. Such is the political connection that the liberal bashaw of Tripoli has guaranteed the safety of European explorers to Bournoo and Tomboctoo, provided they do not pass as Christians or missionaries.

All the modern travellers in Africa certify as to the mild character of the natives, and the hospitable character of the kings and chiefs. Crimes are committed, but chiefly by Arabs and Moors, who infest the towns, and live by larceny and crime. Europeans mistake in calling the Africans savages: they possess, on the contrary, many virtues and sentiments often noble and highly magnanimous.

Slavery is universal; and the chief markets for slaves out of the country now is the Barbary Coast and Turkey. Arabs buy them, and drive them with caravans across the Desert, from Central and Western Africa. The wickedness of man does not end even with inferior animals.

The Desert of Sahara extends over 1,200,000 square miles, and has been gradually extended, and is still extending.

Adams travelled with camels twenty-nine days across one side of this desert, like a sea, without seeing either trees, shrubs, grass, or human being. Riley did the same.

African and Arabian caravans travel from 18 to 22 miles per day. The borden of the camels is from 500 lbs. to 1000 lbs.

The eastern coast of Africa, north of the Tropic of Capricorn, is the most healthy, fertile, and habitable part of that continent.

The most atrocious slave-dealers are the Portuguese. One vessel, in 1818, took on board 1100, 500 of whom perished in the short passage to Brazil, and other 300 in landing. Driven from the western coast by British cruizers, the dealers removed to the eastern, and the isle of Zanguebar became their depôt. For putting a stop to this trade the names of Clarkson, Wilberforce, Gregoire, Raynal, Thornton, Buxton, &c. can never be sufficiently exalted.

A Spanish schooner of 90 tons was lately intercepted, which had 250 slaves on board. Wedged together between decks, just as others pack lobsters, with an allowance of a pint of water per day. Such being the spirit of the treatment of blacks by the Christians, when they obtained the ascendancy in Hayti, in 1791, in two months 2000 whites were massacred, and 180 sugar plantations and 900 coffee, cotton, and indigo, &c. destroyed.

When the superstitious Portuguese sent an embassy to a Moorish prince, 400 miles within Cape Palmas, to en-

quire for their demi-god, the pretended *Prester John*, he told them that he knew but four powerful kings; the king of Cairo, the king of Alimaen, the king of Baldac, and the king of Tocurul. He said he was the lineal descendant of 4404 kings, none of whom had ever received a Christian embassy, and that he should maintain their customs.

The Arabs and Berbers of Africa fully retaliate on the Christians for Negro Slavery, as often as the latter fall into their power. They seize on all wrecked seamen, maltreat them, and sell them for slaves, who are used in an equally merciless manner by men and women, till death or ransom relieves them.

There are 40,000 Black Slaves in Egypt, 12,000 in Upper Egypt, and 20,000 in Deirfour. At Shendy, in Eastern Soudan, in 1818, Burckhardt says 5,000 slaves are sold annually in the public market.

Three hundred miles from the Western Coast a stout boy, according to Landers, sells for 8*l.* and a girl for 10*l.* Arabian horses fetch 40*l.* 50*l.* or 60*l.*

Mourning in sack-cloth, or rags, and ashes, extends across Africa, from Nubia to the Gold Coast.

In Purchas's Travels, page 583, published in 1613, is a full description of the great central river Niger, under the name of the Zaire. Mungo Park was impressed with the same opinion by Mr. Maxwell; and Horneman related that at Bornou the Niger was called the Zad or Enzaddi, its Congo name. It has been long known to discharge more water than the Ganges, and to freshen the sea 60 or 80 miles with an unequalled current. One of Park's letters to Sir J. Banks distinctly describes the course of the Niger to the south, after leaving Bornou. Its magnitude, where it debouches, has long been matter of notoriety; and, in 1795, Maxwell published a survey of it as the Zaire, makes it 15 miles over at its entrance, and 100 fathoms deep; and, he says, that at 600 miles it is as large as at 90 miles from its mouth. The Portuguese have been as usual reserved.

There have been three hypotheses about the Niger, which runs near Tombuctoo. 1. That it is a continuation of the Quarro or Quallo of Landers and Bowditch. 2. That it passes into Soudan, and by the White River of Bruce into the Nile. 3, That it is the Zaire of Congo, derived from its debouches, &c. one of the largest rivers in the world. The Arabs of Ashantee maintain the first, the natives of Nubia, &c. the second, and if the Zaire is not the Niger, we have yet to trace its extensive course; while local evidence, and that of travellers, call the Niger the Zar, the Shary, &c.

Bowditch, in 1819, published a true account of the death of Park, near Boosa, on the Quorra, confirmed to the letter by Landers, and found that, in Ashantee, intellegent natives of Boussa, &c. were of opinion that the Niger and Quorra are the same river.

In 1821, M'Queen, a resident of Fernando, unequivocally published that the rivers in the Gulf of Guinea, from the Benin to the Zaire, were so many mouths to the Niger, and this he stated on local information, not as mere conjecture; exactly confirming the correct announcements of Bowditch in regard to the Quorra, of which the Rio Formosa, or Nun, is but one of many debouches. Both Bowditch and M'Queen were, however, put down by certain dogmatical critics at once the pests of literatnre, and the systematic obstructors of all truth and free enquiry.

Major Denham, Dr. Oudney, and Lieutenant Clapperton, in 1820, penetrated Africa to Bornou, the capital of an African Kingdom, in latitude and longitude 13°, about 850 miles from the coast, and there they saw the Niger, and were told it ran to the Gulf of Guinea. The actual discovery was, however, reserved for the brothers Landers, who sailed down it from the place where Park was drowned, and arrived in the ocean by the Quorra, a well-known river long reported to be the Niger, whose several mouths disguised on the coast its internal extent.

Landers, brothers, made this last excursion, at the cost of government, into Africa, with great ability. They were landed at Bagadry, in north latitude 6.20, east longitude 3.20, and proceeded N. N. E. till they met the Quorra at Boosa, in latitude 10° 15', and longitude 6° 10' nearly. They ascended it to Yaoorie in latitude 11.10 and long 0.16 (about 60 miles,) finding it to vary from 100 yards to half a mile, and to be in the dry season unnavigable. But the Sultan declining to give them safe conduct they returned by the Quorra to the sea, and found that it debouched at Cape Formosa, where it has long been known under the name of the *Nun*.

Landers states that the King of Boossa is considered as the most ancient and powerful of Western Africa, and the Sultan of Bornou of Northern Africa.

The women of Boosa stain their teeth red. Arabic is taught to children, and Mahomedan in their prayers.

Many of the African kings boast of an interminable succession in their families, for thousands of years. They are uncontrolled in power, except by

custom and religion; but, in general, their government is liberal and kind.

Mahomedanism is professed, but the fetisch superstitions generally prevail, and belief in witch-craft, &c. is general.

The cities are groups of mud huts, mostly two stories high. The king's residence is larger, but as rude as those of his subjects. The difference is a lofty mud wall, often extensive.

Polygamy is allowed, and the chiefs have several wives. The tribes make slaves of one another, and these are sold and re-sold for small sums through the country.

They believe in heaven for the good, and in purgatory for the wicked. They assert that God at first made a white man and a black one.

Aged persons do not labour. They are maintained by their children and grand-children, and live at ease.

The Falatahs and Ashantees are the modern disturbers of middle Africa. Their capital is Soccattoo, and they make constant war on their neighbours.

The interior of Africa appears, by Landers, to be diligently cultivated, and crops of wheat, rice, &c. &c. raised with care, though there appears to be a general scarcity of provisions.

It is divided into numerous petty states, consisting of a capital and villages, seldom more than 40 or 50 miles in extent. The kings are poor, and public improvements are not the system of policy.

Ashantee, but 150 miles from the Gold Coast, is a large city containing 40,000 inhabitants, with a magnificent royal palace and splendid court, far advanced in civilization. It has latterly been chiefly known for a war on our settlements, provoked by the villany of slave dealers, in which both parties have suffered in murderous conflicts.

Bowditch says he never saw soil so rich, or vegetation so luxuriant, as in Ashantee, rendered, however, useless by the spoliation of despotism.

The Island of Ferdinando Po, in the Gulf of Guinea, is 30 miles by 20, and from 30 to 40 from the main. Very hot and unhealthy, but in the finest commercial position in the Atlantic, being opposite the Delta of the Quarro and Zaire. The language and character of the natives are peculiar.

St. Helena, on its first discovery, contained sea-fowls, and some seals and turtles, with a forest of trees and shrubs, all of peculiar species, with one or two exceptions. It is now a rock, devoured by rats.

Africa extends through 75 degrees of latitude 5,200 miles, and 65 of longitude 4,000 miles, at the greatest.

Africa is the country called Phul of Phut by the Jewish writers; but they were entirely ignorant of its geography and extent.

All trade in central Asia and Africa is carried on by caravans; a word which means a body of merchants with their goods on camels, generally consisting of several hundred richly laden. The deserts through which they travel are composed of the finest white sand, as mobile before wind as water itself, and moved in waves resembling water; while storms are as fatal in this sandy fluid as those in the ocean. The analogy is rendered more exact by the occurrence of *Oases*, or little islands scattered up and down the deserts, where water is found, often of great fertility, and houses of accommodation, called *caravanseras*. Here they rest for a week or fortnight, and then proceed over the sandy desert, till after some days they arrive at another *Oasis*. Their pace in travelling is from three to four miles an hour, and their routes are so extensive that they are frequently six months on the journey. Sometimes several caravans unite, and make up from two to four thousand camels, and are called *Akkbaahs*. Occasionally they are attacked and plundered, and, if resisting, murdered, by marauding Arabs.

Egypt is a valley formed by the Nile, from five to eight miles on each side of it, and 600 miles long, from the mouth at Damietta to the cataracts. The Nile, in a known course of 1250 miles, receives no tributary streams; and, by its overflows from June to September, it affords three crops of wheat in the same season. This is the only water ever seen in Egypt, for it *never* rains, and this phenomenon is *wholly unknown* to the Egyptians. The towns are on eminences, and during the floods are insulated.

The Nile must rise sixteen cubits to ensure its extent of fertility. In 1829, the inundation of the Nile rose to twenty-six instead of twenty-two, by which thirty thousand people were drowned, and immense property lost.

During summer, on each side of the Nile, says Dr. Clarke, are rich fields of corn and rice, and such beautiful groves seeming to rise out of the watery plains, and to shade innumerable settlements in the Delta, amidst neverending plantations of melons, and all kinds of garden vegetables, so that, from the abundance of its produce, Egypt may be deemed the richest country in the world. But to strangers, and particularly to inhabitants of northern countries, where wholesome air and cleanliness are among the necessaries

of life, Egypt is the most detestable region on the earth. On the retiring of the Nile, the country is one vast swamp. An atmosphere, impregnated with every putrid and offensive exhalation, stagnates like the filty pools over which it broods. Then the harvest regularly begins, and ceases not till the waters return again. About the beginning of May, when intermitting fevers prevail, certain winds cover even the sands of the desert with the most disgusting vermin, in swarms of millions of crawling existence.

Grand Cairo is the modern capital of Egypt, nine miles round, and with a population of half a million. It stands near the eastern side of the Nile, and adjoining it is the rocky mountain Mokaddem. A mile westward, on the Nilé, is Boulac its port; and a mile northward is Fostat, once the capital, but burnt to prevent its occupation by the Christian crusaders in 1220. Cairo, the Hampstead of Fostat, then became the capital; and with reference to the various nations and religions, the splendour and poverty of its inhabitants, it is the strangest assemblage in the world. Mahomedans, Christians, Jews, and Idolators, tawny, black, brown, and white, with camels, horses, asses, and wild dogs, fill its streets, besides abundance of filth. The citadel, near Mokaddem, is three miles round, and contains what is called Joseph's Well, cut 276 feet through the rock, and Joseph's Palace, supposed to be corrupted from *Yussuf*, the name of the magnificent Saladin.

Cairo is the emporium of a great African and Asiatic commerce, and, before the discovery of the Cape, was the focus of the east and west. It is in 30° 2′ N. lat., and 31° 26′ E. lon.; about 90 miles from Alexandria, 59 from Suez, 220 from Jerusalem, 12 from the Pyramids, and 20 miles above the Delta; the Nile being crowded with vessels between Boulac, its port, and Rosetta and Damietta, besides having abundance of pleasure-boats for parties.

Cairo is also remarkable for the minarets of its mosques, and for the splendid sepulchres of its Caliphs, &c. in what is called the City of the Dead. At Fostat is an immense building, called Joseph's Granary, still used as a magazine of corn; near this, are the flood gates which let the Nile into the canal which waters all Cairo, as soon as the Nilometer shews that the waters have risen 28 feet.

The population of Egypt is a confused mixture of Copts, Jews, Arabs of different tribes, and Turks. The peasantry and fellahs are the poorest people in the world, in the most fertile of countries.

In Egypt, a Dongnlese horse is worth 10 or 12 slaves, or 1000*l*. Eunuchs are valued at 1500 piastres. Virgins at 500, and other females from 300 to 700.

Legh passed the cataracts of the Nile without being sensible of any fall. Above them, the country changes its character, and the Berberins are a frugal honest people.

In a late military expedition of the son of Mahommed Ali into Nubia, the monster gave 50 piastres to the bringers of every ear, by which all the country was maimed, that he might send sacks of them to gratify his father, who was making an aggressive war. The same son has lately made an irruption into Syria, and he threatens the Ottoman power in Asia.

Djidda is the Red Sea port of Egypt, and has been raised of late years into considerable importance, as the entrepôt of Arabia, Egypt, and India.

The Oasis of Thebes, five days journey across the desert west of Cairo, abounds in villages, with several ancient temples, Egyptian, Greek, and Roman.

There is a second most fertile and beautiful oasis, 100 miles south-west, of 12 villages, with temples and ruins, called the Valley of Dakel.

The Bedouins are not savages as often described, but live in camps in a state of patriarchal simplicity.

Nubia is a strip of land 4 or 500 miles long, and 1, 2, or 3 broad on each side the Nile, and very fertile. It contains 19 ruined temples, 150 villages, and about 100,000 black inhabitants, with Hindoo features.

The Barbary States consist of Morocco, an empire, Algiers, Tunis, and Tripoli, governed by Deys; though Algiers has lately been taken and occupied by the French. They consist of the fertile plain which lies between the Mediterranean and the Atlas chain of mountains, some of which are 13,000 feet high, and are covered with snow. The plain is also divided by an inferior chain called the Little Atlas. The mountains are the sources of innumerable fertilizing streams, as far as Tripoli, whence to Egypt it is a sandy desert.

South of the Atlas chain lies Biledulgerid; and further south is the Desert of Sahara.

Salt-mines abound in Barbary, and the lakes and spring-water are salt, whence it has been conceived, that the Desert of Sahara was once the basin of a great inland sea, which opened into the Mediterranean, at the Gulf of Syrtis.

The antelope, or gazelle, is a native of Barbary, corresponding with our deer, and as swift, but more elegant. Serpents and ferocious animals are very numerous. Locusts, bred in the deserts, march like regular armies through the country, led by a chief, whom the natives call a *sultan;* but no obstacle, no opposition, diverts their line of march; but after consuming every thing, they are eaten in their turn by the inhabitants, like our shrimps or prawns.

The people of Barbary consist of two or three classes: those on the coast are called Moors; those who occupy the first line of country are called Arabs, living in tents, and moving from place to place; and in the hilly districts of the Atlas chain reside the aboriginals, called *Brebers*, who maintain their independence, and are very warlike. Jews are very numerous, and the troops of the governments are Negroes, brought from the south.

The Moors are austere Mahometans, and their manners are governed by that religion. They have four wives, and often a harem of concubines. The wives of the Deys, &c. are generally Georgians or Circassians. In each family there is, however, a principal wife; and all the women are very industrious in their families, as well as cheerful and amiable. In point of literature and knowledge, the population is in the lowest state.

The governments are absolute despotisms. Morocco is supposed to contain about 7 or 8 millions, Tunis 5 millions, Algiers 6 millions, and Tripoli 2 millions. Fez about 200,000; the city of Tunis 120,000, Algiers 140,000, Tripoli 25,000. The old city of Fez is pre-eminent for its splendour.

It is a maxim of the government of Morocco, that in order to rule the people effectually, there should always be a stream of blood flowing from the throne. The punishments of these despots, according to their humour, are to cause a culprit to be run through the body, strangled, beheaded, or cut to pieces, tied in a bag, and thrown into the sea, impaled on a stake, sawn asunder, burnt alive, suspended from iron hooks, thrown upon pikes, or dragged at the heels of a horse; and sometimes they bury them alive, or cause four walls to be built round their wretched victims.

The sandy deserts of Sahara stretch south of the Atlas chain, over 15° of latitude and 40° of longitude, covering two millions of square miles, with occasional Oases, like *islands*, in a sea of unnavigable and impassable sands, which, carried by the winds, threaten all surrounding countries with silecious inundation.

The Moors of North Africa call themselves *Mooslims*, or Believers; and Barbary, Bled Moos *limin*, the land of Believers. The Jews are numerous, ill-treated, and obliged to wear black. The Arabs or Saracens are most numerous, and are the mobile and active farmers and graziers. The hilly districts are occupied by the Aborigines, called *Berebbers*, or Barbars, and hence *Barbary*. The lowest superstitions pervade the entire population.

The present Bey of Tripoli is liberal to Europeans and the English; but his domestic government is a frightful despotism, and his sons are monsters of wickedness. Plunder of the wretched people, and cutting their throats if they repine, by wholesale, is the habit of the Government. In consequence, the most productive countries in the world, and in the finest climate, are entirely desolated, and possess no interest but in the splendid ruins of ancient temples and cities, whose names it is now difficult even to trace. The whole coast of the Syrtes and Cyrenica is, in fact, a mine of unparallelled antiquities, inscriptions, and works of Grecian art; while the modern towns are collections of mud huts, whose poverty is no protection from assassination and plunder.—*Dellacilla.*

The present Sultan of Morocco, Muley Solyman, has abolished christian slavery, employs no Turks, and keeps no army of blacks to oppress the people. His predecessor, Muley Xized, was a monster of cruelty.

Fatness is the criterion of female beauty in Barbary, and young women are fattened by special diet, just as farmers fatten poultry.

Hawking is still practised by the Moors.

Fezzan is a desert 450 by 370 miles, with numerous Oases.

The Gharians of the mountains of Tripoli inhabit a highly-cultivated table land, the inhabitants of which live under-ground, in caves cut in the limestone rocks. They sink a hole 12 yards square, and 25 or 30 feet deep, and then make passages of 90 or 100 feet, to rooms, in which they live.

The Cape of Good Hope, a geographical and commercial centre of the East and West Indies, is in lat. 34° 29′ south, and 18° 23′ east long. The territory connected with the government contains above 100,000 square miles, or more than half Great Britain. The point of the Cape is called Table Mountain, with two summits, the Devil's Hill and Lion's Head. To the north, on the town side, it is perpen-

dicular for two miles. It is 3582 feet above the level of the sea; the first 500 feet is granite; the summit is sandstone, but without petrifactions. The soil is stiff clay or light sand, and large tracts are covered with arid sand; the eastern side is the most fertile.

The climate of the Cape is mild and healthy, the thermometer ranging between 90 and 40°. The south-east winds in summer are very hot and squally; and, in winter, the north-west winds bring fogs and rain, with thunder-storms and torrents of water. Excess of eating and drinking renders longevity uncommon. The colony yields all European productions; and many tropical ones; but not a 1000th part is in cultivation. The Dutch first settled the Cape in 1650. Provisions are exceedingly cheap —meat 2d. per lb., bread 1d., and the best wine 6d. per quart; there are also abundance of fruits and vegetables. The Cape sheep are remarkable for the weight of their tails, which are from 6 to 14 lbs. Ferocious animals of all kinds occupy the boundaries of the settlement, and there are abundance of birds of prey, ostriches, and smaller birds.

At the Cape, the landholders are the *Wyn-boor*, (wine-grower) the *Koornboor*, (the corn-grower) and the *Veeboor*, the grazier. Some French Protestants introduced the vine. The wine has what the Dutch call the *capesmaak*, which is fatal to its use, and is said to arise from the stalks of the bunch being pressed with the grapes. The Drakenstein approaches nearest to Madeira, &c. The Stein to Rhenish; the dry Pontac to Port and Burgundy. The sweet wines are luscious, without flavour; but all have a cold bitter taste, which must result from bad management, or the clayey soil. The wheat is excellent, and it is sold in *Muids*, of 3.1 bushels. The graziers have immense tracts in the interior, with ill-contrived dirty houses. The new settlements near Algoa Bay, &c. are miserable traps for needy and desperate emigrants.

Campbell, a missionary, describes the country 700 miles north by east of the Cape, as highly beautiful, and containing towns and villages, in which the arts of life are practised with success. The chiefs keep a rain-maker, who pretends to produce it by incantations, but Mr. C. prayed, and rain came!

Graham's Town, 700 miles from the Cape of Good Hope, contains 3000 English inhabitants, who live in great wretchedness.

The Bosjesmans are a race of men between the Hottentots and the ourang-outang, which latter they resemble, but have a larynx and powers of speech. The men are from 4 feet 6 inches to 4 feet 9, and the women from 4 feet to 4 feet 4. They have high-cheek bones, flat nose, concave visage, and little rolling eyes, like apes; protuberant bellies, and very large projecting posteriors, composed of masses, like jelly. The women, too, have a peculiar projecting deformity, many inches long, like the excrescence on the beak of the turkey. They are as active as monkeys, and for the most part go quite naked. They live chiefly on vegetables, and are very harmless, except in self-defence, for they are shot by settlers, without compunction. Their weapons are poisoned arrows, and their district adjoins that of the Hottentots, whose language they use; and in many respects they resemble them.

The Caffres, or Kousses, occupy a tract in Southern Africa, 300 miles in lat., and 350 in lon. They are a well-formed pastoral people, of quiet and industrious habits, far superior to any of the other black inhabitants of Africa, and a different race from the Negroes or Hottentots.

The Isle of Bourbon is a volcanic eruption, about 100 miles round. It consists of two volcanic mountains, one of which still burns, the other is 9000 feet high. It is near the Isle of France, and the two are styled the Mauritius. They were settled at the beginning of the last century by the French, but one is now English.

The Azores were discovered by Vanderburgh, of Bruges, in 1439; and settled by the Portuguese in 1449. They are volcanic, and very subject to earthquakes. On four several occasions after earthquakes, new islands, red-hot, have been thrown up, but two of them sunk again. They are supposed to be near the site of Plato's Atalantis. In 1808, a volcano broke out in St. George's, which raged for some weeks, and threw up a temporary crater 3500 feet high, besides covering the island with its products.

The Canary Islands were known to the ancients, and called Fortunate Isles. There are seven of them, between 28 and 30° N. lat. Ferro used to be adopted as the first meridian, but Grand Canary and Teneriffe are the principal islands. The natives defended themselves against Europeans for many years; but the Spaniards effected a settlement in 1487. The climate is delightful, and the soil fertile, producing excellent wine, and all necessaries and luxuries. Teneriffe is remarkable for its Peak, which is 12,230 feet high, formerly a volcano, and can be seen 100 miles off; and all the islands

contain pumice and ashes. The Popish religion is in full power, and is the only drawback to agreeable residence.

AMERICA.

The first known discovery of America was by Martin Behem. In a first voyage of discovery, in 1460, he found an island covered with beech-trees, which he therefore called *Fayal;* and others abounding in hawks, which he therefore called *Azores*. He afterwards visited Brazil, and sailed as far as the Straits of Magellan in 1484. The voyage of Columbus was in 1492.

Moreri maintains that America was known to the Egyptians, Phœnicians, and Carthaginians, and it seems highly probable.

The continent of AMERICA extends from 75° north to 55° south latitude, or about 8000 miles in length; and in its broadest part has 40° of longitude, or 2000 miles. In the Mexican isthmus it varies from 100 to 200 miles.

North America is divided between the United States, Mexico, and the British provinces of the Canadas.

South America into the Brazils and the Republics, formerly Spanish colonies, of Columbia, Peru, Chili, and Buenos Ayres, with a new state on the Paraguay.

America contains the highest mountains and the largest rivers in the world, with every variety of climate; and its governments being, for the most part, free and liberal, the whole is rising on the decay and exhaustion of the old continent.

The breadth of the North American continent, from Long Island to Vancouver's Island, is 50° of 52 miles, or 2600 miles; and length of the United States is about 15°, or 1000 miles.

The distance from Cape Clear in Ireland to New York, is about 3000 miles. The distance from the western coast to China, is about 5000 miles.

The breadth of the South American continent, from Salvador to Lima, is about 45° of 60 miles, or 2700 miles.

In recent observations on the Andes, by Pentland, he asserts, that Nevado de Sorato is the highest of them, being 800 feet higher than Chimborazo, or 25,200 feet; and he considers Illimani near Paz, in Bolivia, as equal to Chimborazo, or 24,200 feet.

The Gulf of Mexico, the drainage of North America by the Mississippi, may be regarded as the lake or debouche of that great stream.

The Isthmus of Panama, about 70 miles wide and 350 long, is considered as the boundary of North and South America. When the two oceans are joined by a canal, this Isthmus will be the centre of the commerce of the world.

America is calculated to contain half the useful soil of the old continent, or about ten millions of square miles, each capable of supporting 350 persons, or four times the present population of the earth. The entire population is 35 or 40 millions.

All travellers infer a similarity between the American natives and the Tartars, in manners, opinions, and language. They have like superstitions, and say they were driven away by the rising of the waters. All the tribes dwindle in numbers, from various diseases and bad practices.

It seems to be certain, that the copper-colour races are becoming extinct. They disappear rapidly in both Americas, and the Pacific.

The American Indians, for the most part, take upon them the name of some animal; as the blue snake, the little turkey, the big bear, &c.; and their signatures to conveyance deeds of land, &c. consist of the outline, drawn with a pen, of the animals whose names they bear.

An Indian calumet of peace is a long pipe adorned with feathers. Belts of wampum consist of shells, black and white, in the form of beads strung upon a thong. By them they recollect events, and they serve instead of writing, being variously constructed for different purposes.

Behring's Straits are from 40 to 50 miles wide, and between lat. 65 and 66. Navigation is obstructed by the ice two or three degrees to the north of them, the Asiatic coast bending westward, and the American eastward.

The north-east cape of North America is in 69.41 N. lat., and 82.35 W. lon.

Behring discovered the strait between America and Asia in 1741. Kotzebue's Sound is in lat. 66° 42′ 30″, and lon. 164° 12′ 50″; and he found mammoths' bones in the vicinity.

Captain Cooke explored the entire north-west coast, to lat. 70, in 1779.

The Esquimaux appear to inhabit the entire coast of the North American Ocean, from Greenland to the south of Behring's Strait, with uniformity of language and manners.

The Esquimaux, seen by Parry, are five feet five, and the women five feet. They live in huts built of ice and snow, entered by long passages, and divided into apartments, with well-constructed dome roofs, lighted by a sheet of ice, and kept warm with lamps. They have the Tartar physiognomy, and are warmly clothed with double deer's-skins. A community consists of five huts, and sixty men, women, and children, with canoes, sledges, and dogs

to draw them. They kindle fire, by striking two pieces of pyrites into dried moss.

Captain Franklin compares an Esquimaux ice-house, with its dome, its transparent walls, &c. to a Grecian temple. An Esquimaux, who might have lived in a house of wood, built one of ice, for increased warmth and comfort.

Captain Ross found a tribe of Highland Esquimaux, who, having no wood, have no canoes or means of embarkation, and have not the art of making canoes of skins.

At Winter Harbour, lat. 74° 46′ 56″, 6862 lunar observations, and five chronometers, which did not vary 3″, gave the longitude 110° 48′ 29″. They had sailed three degrees further west.

Copper-mine River falls into the sea in lat. 67° 43′, and lon. 115° 50′. Near this river, every valley is a lake, and every river a string of lakes. The trees are larch, spruce, and poplar, of diminishing size.

Russia, not content with its vast Asiatic territories, has, it seems, seized on and claimed a large tract of territory on the eastern side of Behring's Straits. It extends over 25° of lon. and 10° of latitude, and includes all the northern discoveries of our Cooke.

The Aleutian islands stretch from America to Asia, like the piers of a bridge. Kodiack and Oonalashka are the largest. Schetekoff, a merchant of Irkutsk, formed a settlement in Kodiack about 1787, and, since then, they are claimed as part of the already too-extended Russian despotism. They lie in lat. 49 and 58, and did contain 50,000 natives, but now reduced by ill-treatment to 2 or 3000. The barbarians who invaded the savages, in like manner have made an equally destructive war on the harmless and affectionate seals, sea-horses, sea-calves, and sea-lions, who, till their encroachment, enjoyed this remote coast in happy communities. They destroy hundreds of thousands per annum, with every attendant atrocity, for the sake of a shilling or a crown, which they get in China for their skins.

Canada was settled by the French in 1534, and taken from them in 1760, by Wolfe and Amherst. It is now divided into two governments, Upper and Lower Canada, and is about 1500 miles long, bounded on the south by the great lakes and the St. Lawrence, and indefinite to the north. The capital of Lower Canada is Quebec, and of Upper Canada, Kingston, 385 miles distant. The political constitution is very liberal, and there is a representative legislature. In 1663, it was visited by a very remarkable earthquake, which changed the face of the whole province, and continued with little intermission for six months, overturning forests and mountains, and changing the courses of the rivers. The soil is a spade deep of black earth, and beneath is a stratum of clay. The seasons are extreme, both in cold and heat; in summer 92°, and in winter from 20 to 28 below Zero, and sometimes 96 in summer and 40 below Zero in winter. Snow covers the ground in October, and does not wholly disappear till May. In Upper Canada, the seasons are milder. The rivers in winter are travelled like roads by horses and sledges. Different parts of the two provinces lie between lat. 43 and 50. The extreme cold is ascribed to the uninterrupted blasts from the arctic regions, and the extreme heat to the extended surface, concentrating a mass of the sun's rays.

In 1828, 508 vessels arrived at Quebec, bringing 11,160 settlers; and, in 1829, 708 vessels and 12,823 settlers. In 1830 and 31, the numbers have been above 40,000.

Canada, the Canaan of the British-transporting committee, is in summer the hotest country in the world, and in winter the coldest, though dry. There are two mild months in spring, and two in autumn; foar broiling months in summer, with myriads of mosquitoes, &c., and four months of invariable snow and bitter frost, reckoned the most agreeable part of the Canadian year. The British emigrants go chiefly into the United States to the south, on the Ohio, in lat. 40.

The Catholic is the prevalent religion of Canada, but the Protestants in very numerous sects, (some say 200) out-number them; and there is a public provision for the Church of England, and the Kirk of Scotland.

The whole province of Nova Scotia is equal to 14,000 square miles, and it lies between lat. 43½ and 48.

The 13 United States, by the addition of the Floridas and Louisiana, have been extended to 29, besides extensive unarranged tracts, equal to one million of square miles, the whole being nearly 2½ millions of square miles.

The largest state is Virginia, 64,000 square miles, with a population of one million.

New York contains 46,000 square miles, with a population of 1½ million, being 34 to the square mile.

The population of Massachusets is 69, of Rhode Island 64, and of Connecticut 63 to the square mile; but some of the new states do not contain above two or three to the square mile. These States

are about equal to all habitable Europe, being 2,364,400 square miles; and all Europe, including Iceland and Nova Zembla, &c. being 3,432,000 square miles, of which a million approaches the arctic circle.

The United States, in 1830, contained 12,700,000 inhabitants, of whom 1,950,000 were slaves. In 1790, the white population was 3,104,148. In 1800, it was 4,312,841. In 1810, 5,862,092; and, in 1820, 7,861,710: being more than double in thirty years. The immigrations are estimated about 10,000 a year, which in thirty years would be 300,000; and, if multiplied by eight, would be 2,400,000; besides, the states have been increased by the Mississippi and Floridas, to the number of 1,000,000.

The climate of the United States includes from the tropic of Cancer to lat. 50, but it is colder and hotter than the old continent in the same latitudes; the differences being 9° in the lat. of Philadelphia, and 12° in that of Boston; while snow lies on the ground from thrce to five months, between lat. 40 and 50, and the summer heats are from 80 to 100; and in some places it is often 22 below Zero in winter, and 105 in summer.

New York is in lat. 40° 40′, and Rome in 41° 54′; yet the average of the thermometer for the year is, at New York, 53.8, and at Rome 60.4; while, in the three winter months, the ther. averages at New York 29.8, and at Rome 45.8; and, in the three summer months at New York, it is 79.2, and at Rome 75.2.

Four-fifths of the population are engaged in agriculture, and the other one-fifth in manufactures and commerce. The unproductive classes are one fifth more.

The Indian population is about 120,000, and the other Indians around are 180,000.

The militia are 1,000,000. The regulars 6000.

The whole coinage is 32 millions of dollars.

There are 106,000 miles of post-roads, and 7530 post-offices; letters of one ounce passing from 80 to 150 miles at 12½ cents.; magazines and newspapers pass 100 miles at 1½ cent. per sheet; pamphlets at 4 cents.

There are above 812 newspapers, and 185 in Pennsylvania only.

Twenty-two canals have been formed or are executing, one the Chesapeake and Ohio, 360 miles; the Ohio 306, and the Miami 265 miles, and the Pennsylvania 296.

The Baltimore and Ohio rail-road is 180 miles, with one summit for stationary power, many bridges, and 1 tunnel.

The Duke de Liancourt states that he saw but one beggar in the United States.

Slavery is still tolerated in the United States, and greatly on the increase; the 700,000, in 1790, having increased to above 1½ million in 1820. Virginia alone contains nearly half a million, and the two Carolinas another half million; but, in the six northern states, slavery is prohibited.

Congress is elected annually, but in the seven most distant states triennially. The number of the senate is 48, being two from each state; and the number of the lower house is 216, returned according to population—New York sending 34, Pennsylvania 26, and Virginia 22, while some of the new states elect but 1, 2, or 3.

The salary of the president of the United States is 25,000 dollars, of the vice-president 6000, the secretary of state 6000, and the chief-justice 4500. The whole state expenditure, civil and judicial, is 92,500 dollars, or 20,812*l*. Provisions, &c. are about half what they are in England. Abroad they pay three consuls 2000 dollars each, while the consuls of England cost, in 1830, 87,970*l*. Each state, like our counties, has also its own expences, at least as much more. The civil and judicial departments in Great Britain are about 10 millions of dollars.

Every member of the House of Representatives, in the United States, has 40,000 electors.

Members of Congress are paid eight dollars per day, and eight per twenty miles for travelling expences. The President of the Senate and Speaker received 3000 dollars each per annum.

New York is the great emporium of the commerce of the Western world. It contains nearly 250,000 inhabitants, and is superbly built on the finest harbour in the world. It imports half the amount of those into the whole United States, and exports a third. Its harbour always presents a forest of 800 ships at anchor, and about 1600 foreign voyages, and 4000 coasting ones proceed from its port every year.

The countries watered by the Mississippi, and comprehended in the United States, is 1400 miles long and 1200 broad, comprehending an area of 1½ million of square miles, or more than three times as much as the 13 ancient states, which are estimated at 400,000 square miles.

The Alleganies cover a tract 1100 miles long and 120 broad, being from 1000 to 6000 feet high. The land near them consists of their substance. The tracts near the sea, 20 or 50 miles wide, is a sandy encroachment on the sea, brought down by the rivers Connecticut, Hudson, Delaware, Susquehannah, Potowmac, and six or seven others, which

run from the mountains to the sea, from 200 to 350 miles. The drain on the other side of the mountains is the Mississippi and its branches.

New Orleans, in 1829, exported 360,000 bags of cotton.

The river Ohio, which gives name to a state in America, runs into the Mississippi, and at certain seasons is navigable for ships of 300 tons. The present population of the state is nearly a million, and it extends over 40,000 square miles, between 39 and 42 degs. of N. latitude. Columbus and Cincinnati are its largest towns. The river Ohio is nearly 1200 miles long, before its junction with the Mississippi, and nearly one-third of a mile broad.

The Alleganies afford coal, the western side salt, and the different states iron, copper, and lead in great abundance. Sugar is made in large quantities from the maple-tree; wheat affords abundant crops; tobacco grows in the midland and southern states; and cotton and rice flourish in the southern.

The sugar-cane succeeds in Louisiana, and yields half the sugar used in the Union; an acre producing 9 or 10 cwt. Rice is also a productive crop, an acre, in moist situations, yielding 10 or 12 cwt., and in others 5 to 10. Indian corn yields from 40 to 100 bushels per acre, and wheat from 22 to 50. Tobacco about 1400 cwt. and cotton, when prepared for the market, from 1½ to 2 cwt.

Dr. Dwight properly prefers the view of the successions of New England, villages composed of neat houses adorned with gardens, farm-yards, and meadows, with every man on his own ground, to the palaces, castles, and mansions of Europe, surrounded by mean cottages and filthy cabins. Every village, too, has its schools and its public library.

The passage from New York to Havre has been made in 16 days, or 201 miles per day, and in the same time to Liverpool.

Steam-boats, on the American coast, run from 16 to 18 miles an hour. 48 make regular voyages from New York.

The Cherokees now possess negro slaves, and live by agriculture.—*James.*

The chiefs of the Osage and Missouri Indians are called Inca. The small-pox, and spirits, are the scourges of the Indian population, and have often reduced large tribes to a few families.

Religious fanaticism, in every burlesque and crazy variety, interferes, in the United States, with all enjoyment, and governs the women with despotic sway; and to re-assure their influence, itinerant priests, of all sects, go about periodically to revive religious habits. In consequence, there is no gaity or merry-making; and between fanaticism, smoking, boozing, and toil, a vulgar gloom pervades American society.

In the United States, married women and single ones are called *Miss*, but the latter are distinguished by their christian name.

No Americans ever wear liveries; they consider that in England they disgrace the wearers.

The Saratoga Springs is the fashionable Spa of the United States. They are beyond Albany, the seat of the government of New York state: and the route to them is by Hudson's River, in the magnificent steam boats of 8 or 900 tons. The same route conducts to Lake Erie, and to other lines of steam-boats to Quebec. A more delightful summer tour cannot be imagined. From Liverpool, by the superb New York packets, it is a three or four months' excursion, novel, safe, and luxurious, at a cost per head of 30*l.* a month.

The language of California has no affinity whatever with that of Mexico, though so near; and their manners, customs, and superstitions have no resemblance to anything Asiatic, though they say they came from the north. Their three tribes speak languages altogether dissimilar; and a Spanish missionary says, there are in this peninsula seventeen languages, with little affinity. They are stupid, lazy, and brutal, go naked, but are fond of ornaments. The peninsula contains about 85,000 square miles.

The mines of Mexico and South America, per Humboldt, yield, in sterling value, 1,273,000*l.* gold, and 7,168,000*l.* silver per annum. Jacob estimates the produce from 1500 to 1810 at 9¾ millions, and from 1811 to 1820, 3½.

The republic of Guatemala includes the narrow part of the isthmus of Mexico, with a population of one million and a half.

In 1825, the Congress of Mexico decreed the construction of a canal across the isthmus of Tehuantepec, to join the two oceans in lat. 18, lon. 94.

Tepic, in New Galicia, 40 miles inland from the fine port of San Blas, is the chief seat of Mexican commerce on the Pacific, and a flourishing city.

Dr. Kelly, in 1825, estimated the republic of Mexico at 6,868,000 inhabitants; Guatemala at 1,485,000; Columbia 3,600,000; Peru 1,900,000; Chili 1,200,000; La Plata 1,500,000: all on rapid increase.

The table land of Mexico is healthy, but unfruitful, while the coasts are unhealthy, but adapted to produce more than all the world could consume. The only anchorage, however, on the

east, is Vera Cruz, a seat of pestilence, and the gulf being a marine *cul de sac*, receives, as a dam, the whole force of the Atlantic. On the west, there are two ports, San Blas, and Acapulco. Mexico contains 200,000 inhabitants in a highly picturesque district, and fine climate. The population of Mexico and New Spain is now nearly 8 millions, of all mixtures of colour, covering one million of square miles. In wheat, the increase is 50 and 80 to 1, and in maize 200 to 1.

The Bermudas were discovered in 1527 by a Spaniard of that name. In 1612 they were settled by the English. They consist of four principal islands, Bermuda, St. George's, St. David's, and Somerset. The population is about 10,000, white and black, on about 50 square miles.

The island in the Bahamas, which Columbus first discovered, in 1492, was Gunnahani; he called it St. Salvadore, and the English, Cat Island.

Newfoundland was discovered by John Cabot, a Venetian, on the 24th of June, 1497, in a squadron of discovery which sailed from Bristol.

The British West Indies are Jamaica, Barbadoes, Tobago, Trinidad, Grenada, Dominica, Antigua, St. Kitts, with the Virgin Islands, Nevis, and Montserrat, and the extensive colonies of Demerara and Essequibo, besides settlements in Honduras.

The Spanish are Cuba and Porto Rico. The French, Martinique and Guadaloupe. The Dutch, St. Eustatia and Curaçoa. The Danish, St. Thomas's.

Domingo is an independent black sovereignty, populous and important.

The slave population of the chief British colonies is as under—

Jamaica	331,119
Barbadoes	80,551
Demerara	71,382
Trinidad, Grenada, & St. Vincent	26,000

The Blacks being 658,000, males and females, in fourteen colonies.

The Antilles derive their name from ante-Insulæ; and are divided into the lesser, as Barbadoes, Dominica, &c. and the greater to the west, as Cuba, Jamaica, &c.

Cuba, the largest of the West India islands, is 764 miles long, and averages 100 miles broad. It is very fertile, and not unhealthy in climate. Its most profitable productions are tobacco, cigars, and snuff. Its population is above half a million, and it remains attached to Spain.

Nothing is more miserable than the condition of the Negro throughout the West Indies. He is disgraced with the indelible mark of slavery, by stamping with a hot iron upon his arms, or upon his breast, the name or the mark of his owner. A narrow unwholesome hut, without any conveniences, serves him for a dwelling; his bed is a hurdle, fitter to put the body into torture than to afford it ease. Some earthen pots and a few wooden dishes are his furniture. The coarse linen which covers part of his body, neither secures him from the insupportable heat of the day, nor the dangerous dews of the night. The food he is supplied with is cassava, salt-beef, salt-cod, fruits and roots, and are scarce able to support his miserable existence. Deprived of every enjoyment, he is condemned to perpetual drudgery in a burning climate, constantly under the eye of an unfeeling task-master.—*Raynal.*

Negroes in the West Indies, the property of desperate speculators or insolvents, are in the situation of the operatives in our manufacturing districts, who work in connection with similar persons. In England, they are called grinders, and in the West Indies cruel task-masters. Laws ought to protect slaves and dependants, against both. They are not wanted for the humane and respectable; but this is a principle forgotten by our legislators.

A purchased slave in Cuba costs, it is asserted by the West India Planters, 45*l.*; but in British islands the rearing, till 14, costs 87*l.* Sixty out of every 100, too, are effective in Cuba, and but 44 in the British islands. Both causes render the production of sugar, 11*s.* + 4*s.* 10*d.*; or 15*s.* 10*d.* greater in them than in Cuba.

Stories confidently prevail on the Oronooko, of a hairy man of the woods called Vasitri, who builds huts, eats human flesh, and carries off women.—*Humboldt.*

The French settlement at Cayenne, nearly under the equator, produces the famous Cayenne pepper, from the capsacum baccatum, which is dried in the sun, pounded, and mixed with salt. It also produces arnotta, sugar, coffee, &c. The soil is very fertile, and the climate as good and healthful as any in the West Indies. The extent is 80,000 square miles.

The nineteen provinces of Brazil contain but five millions of inhabitants, of whom two are slaves.

Brazil is 2300 miles long, and 1100 broad, in a fine climate, with a luxurious soil, and connected by the Parana and various rivers; besides enjoying the advantage of a line of coast equal to its length, with many fine harbours. Its luxuriance is such, that its extensive woods, often for a

thousand square miles covered with the largest trees, are absolutely impenetrable, except to the birds who abound in their branches, and to innumerable crawling creatures who live on their fruit and bark. The native population is very trifling, but they are well-made, active, and very wild. The Portuguese, who live on the coast, have the lowest moral qualities, and are the abject slaves of an ignorant priesthood. Every production of the tropics will grow here, and many of those of the temperate zone. Gold mines of considerable value, and also diamond mines, have been worked with great profit for above a century and one of the largest diamonds in the world was found in the mining district, which is in the interior, among the mountains. Cape St. Roque is in south latitude 5° 17′; Cape St. Augustine 8° 26′; Rio Janeiro 22° 54′; and the Brazil point of Rio Plata 34° 57′. It is a country of inexhaustible wealth and power of production, and, in any hands but the Portuguese, would be the first country in the world.

St. Sebastian, the capital of Brazil, is the dirtiest of all dirty Portuguese towns, in the most enchanting district in the world.

The Rio de la Plata, an arm of the sea, which receives three great rivers, the Paraguay, the Parana, and the Uraguay, is 150 miles broad at its mouth, and is an opening and drain to vast plains, which extend on every side to the Andes. On its south side stands the city of Buenos Ayres, celebrated for its extent and regularity, and the seat of a republican government, which asserts its ascendancy over immense tracts of country. The thermometer varies from 100 to 45, and every degree of climate is experienced according to elevation. Thunder-storms are very common, and often fatal; but, in general, the climate is remarkably salubrious, and productive of the luxuries of every part of the globe. The latitude of Buenos Ayres is 34° 36′ south; Santa Fé 31° 40′; Assumption 25° 17′. Prodigious numbers of settlers from Europe go to these provinces; and if the government is just and wise, they will rival North America, the climate being finer, the soil richer, and the productions as abundant as various. The extent is about a million of square miles, or 50 times larger than the island of Great Britain. This coast was first discovered by Martin Behem, and the Spanish Admiral De Solis, who was killed and eaten in 1516 by the Indians. Sebastian Cabot made the first settlement. Buenos Ayres was built by Mendoza in 1535. The city was afterwards completed, and its government carried to perfection by the Jesuits. Wild cattle are so abundant, that an ox may be bought for a dollar, and a good horse for two dollars. There are millions of them ranging at large in boundless tracts of meadow, or pampas, covered with grass.

In the Pampas of Buenos Ayres, twelve millions of cows, and three millions of horses are property, besides the wild herds without number.

On the marriage of Philip and Mary, the Spaniards of Chili seized the district of Tucaman, called it New England, and built a town called London.

In spite of the benevolence and paternal care of the Jesuits in Tucaman, the population visibly declined, and without obvious causes, since every means were adopted to cause an increase.

The military music of the Apibones consist of horns and flutes, made with the leg-bones of birds and beasts, and trumpets made with the shell-bone of an armadillo's tail. Skulls of Spaniards were their drinking cups. Their bows are formidable, as high as a man, and so elastic, as to be as straight as a staff; the string is fox-gut, or palm-cord. The arrow four or five feet, and headed with iron, hard wood, bone, or a fox's leg-bone.

Owing to the increase of the horse in the pampas, the Indian nations south of the Amazons have become equestrian, like the Tartars. The Apibones, by this means, took terrible vengeance on the more cruel Spaniards, from the La Plata to the Pacific: and were in every sense the murderous Tartars of those provinces. At length, they quarrelled among themselves; the Jesuits converted some of their leaders, and in due time brought the chief part into communities called Reductions.

The republic of Chili lies between the 24th and 36th deg. of south lat. in the best climate of the temperate zone, and includes the fertile level tract, 300 miles wide, which lies between the Pacific Ocean on the west, and the Andes on the east. Its capital, St. Jago, is in lat. 33° 16″, and about 250 miles from the sea and 50 from the Andes. In these mountains there are fourteen recent volcanoes, and some of them commonly burning; hence the country is subject to earthquakes, and the houses are built low. The productions of every climate arrive at perfection in it. Marine substances are found every where, even on the tops of its secondary mountains. Gold is very abundant, and there are many valuable mines, besides the quantities found in the beds of rivers. Silver, copper, and iron are also very abundant, as well as pit-coal. Many of its trees are of gigantic size

particularly the red cedar, and there are few or no noxious animals in it.

The boundary of the republic of Peru is the river Tumbez, in latitude 23° 26' south, and it is separated from the Chilian territory by the Loa, in latitude 15. It contains about 260,000 square miles.

In passing the Andes, and parts of them, travellers ride on a man's back. Those miserables are mulattoes, called *carguerros*, and in many places are very numerous. They carry from 165 to 195 lbs. for eight or nine hours, in situations where no mule could be trusted. Their pay is about 2*s*. per day, and robust young men covet the employment.—*Humboldt.*

In Mexico, the directors of mines ride in this way, on the backs of an Indian called a *cavallito*, two of whom are saddled every morning, and walk with a cane, so as to stoop forward.

In Jacre, to avoid the mountains, the postman passes monthly down the rapid Chamoya, tied to a log of wood, with his letters secured on his head, and thus keeps up the intercourse on both sides the Andes.—*Humboldt.*

Juan Fernandez is peopled by the Spaniards, who now have a garrison and governor there.

Tristan da Cunha, in south lat. 36½, is a rock, with a mountain upon it 8500 feet high, and 25 miles round; inhabited by a few stragglers under one Glass, formerly in the British artillery.

The Danes have three colonies in the West Indies, St. Croix, St. Thomas, and St. John; and two colonies in the East, Tranquebar, near Madras, and Serampoor, near Calcutta; well known as the head-quarters of missionaries.

The French colonies are Martinique, Guadaloupe, Marie Galante, and Deseada in the West Indies; Cayenne, in South America; Algiers, Senegal, and Goree, in Africa. Bourbon in the Indian Ocean; St Marie in Madagascar. Pontichérry, and Chandernagor in the East Indies.

The republics of Columbia and Bolivia include provinces whose coasts are bounded by the Caribbean Seas and the Pacific, extending over 20 degrees of longitude and 8 of latitude, or about 1200 miles by 500.

The plains watered by the great rivers of South America are called Calobaza, Apure, Oronoco, and Llanos, which last is a sandy desert, like that of Sahara, in Africa, and so level, that, in 18,000 square miles, the inequality does not exceed five inches. The heat is from 110 to 115°. In the rainy season it is flooded by the rivers.

The river Amazons rises in the mountains of Quito, and runs 3400 miles before it discharges itself, by ten channels, into the Atlantic. Orelhan, a Spaniard, sailed its whole course in 1541. When joined by the Apurimac, it is 150 miles wide, and it is 40 fathoms deep, 1500 miles from the sea.

Lake Maracaibo, in the Caraccas, which communicates with the sea by a bar, is 150 miles long and 190 broad; and Lake Valentia, in the same country, is 40 miles long and 12 broad. The former is noxious with sterile shores, but the latter remarkably fertile.

The road from Port La Guayra to Caraccas resembles that over Saint Gothard, and the elevation of Caraccas produces a day temperature of 67° to 70°, and a night of 60° to 64°, with luxury of production.

The Oronooko is the country of mosquitoes and insects. No one can sleep, except among cattle, which they prefer to man; or in a hole, from which they have been expelled by smoke. The table land, at 400 yards high, is free from them; and this tract extends hundreds of miles, to forests which adjoin the Andes.

Analogy of climate is no evidence of identity of production. The plants and animals of America are altogether different from those of the Old Continent. The distribution depends on some unknown law; mountains, table-land, deserts, rivers, and temperature agree, but the organizations are different.—*Humboldt.*

The vast countries called Spanish Guyana, between the Oronooko and the Amazons, are literally without inhabitants. Humboldt often did not see 50 in 100 miles, though it is the most fertile and magnificent country in the world.

The Llanos or Pampas of South America are green in the rainy season, and burnt up in the dry season. In the former, they represent an ocean of verdure, without a hillock a foot high, for 50 miles, in every direction.

Humboldt states, that at Cariaco, a planter who had but eight negroes caused the death of six by barbarous flogging; two dying on the spot, and four afterwards. Another similar case had recently occurred.

A missionary priest in the Caraccus told Humboldt, that sleep and eating beef were the chief pleasures of life, and invited the philosopher to see one of his cows killed, by cutting the hamstrings, and plunging a knife into the vertebræ. At the Missionary College, the priests, instead of oil or butter, eat the fat of young birds, killed in millions for this important purpose, expressed, and kept in jars.

The Otomacs on the Oronooko, for several months in the year when they cannot fish, eat earth. They have balls

of it in their huts. It is a fine unctuous clay, of a yellowish colour, and the eating it does not injure them.

The best modern system of geography is that of MALTE BRUN. The best geographical gazetteer is the EDINBURGH. The most practical work on the use of the globes is by MISS PHILLIPS; and the best syllabus of geography, for young persons, is the Abridgement of GOLDSMITH, at *one shilling*, with his Geographical Copy-Books as exercises.

ASTRONOMY.

Astronomy, the science of the stars, and of the phenomena of the Universe, still claims the veneration and attention of all thinking men, in spite of its alliances with various superstitions, and of the frivolity which at all times govern the majority of mankind.

The British Museum contains the original work of Copernicus on the Solar System. Its title is—

"NICOLAI COPERNICI TORIENSIS de REVOLUTIONIBVS ORBIUM cœlestinm Libri VI.—Habes in hoc opereiam recens nato, & ædito studiose lector, Motus Stellarum, tam fixarum, quam erraticarum cum ex ucteribus, cum etiam ex recentibus obseruationibus restitutus: & noois insuper ac admirabilibus, hypothesibus ornatos. Habes etiam Tabulas expeditisimas ex quibus eosdom ad quodius tempus quam facilli me calculare poteris. Igitur eme, lege, fruere.

Norembergæ apud Joh. Petreium,
Anno M D XLIII.

It is dedicated—

Ad Sanctisimum Dominum PAVLVM III. Pontificem Maximvm.

And there is a laudatory letter from NICOLAVS SCHONBERGIVS, Cardinalis Capuanus, Nicolaro Copernico, S. dated Rome, calend. Novembris, anno M D XXXVI.

It is a small folio of 196 pages, full of diagrams, and well printed, at the expence of the Cardinal.

The first recorded observatory was on the top of the temple of Belus; the tomb of Osymandias, in Egypt, was another, and it contained a golden circle 200 feet in diameter: that at Benares was at least as ancient as these. The first in Europe was at Cassel in 1561; that of Tycho Brahe was the second in 1576, at Uranibeig. The next was at Greenwich in 1675, and contains a transept circle by Troughton; a transit instrument of eight feet, by Bird; two Mural quadrants of eight feet, and Bradley's zenith sector. The telescopes are 40 and 63-inch achromatics, and a six-feet reflector: there is also a famous camera obscura; and Flamstead had a deep well, now filled up. The Paris observatory was built in 1667, that of Berlin in 1711, that of Nuremberg in 1678, at Bologna in 1714; and at Pisa in 1730, at Utrecht in 1690, at Copenhagen in 1656, at Stockholm 1746, and at Lisbon in 1728. Latterly, every university has had its observatory; and there are also several private ones scattered over Europe and the United States, and one at the Cape.

There is now a society in London for the improvement of instruments, and the promotion of observatories.

The latitude and longitudes of some of the principal observations are as under:—

Greenwich	51°	23′	39″	First Meridian
Paris · ·	48	50	14	2 20 15 E.
Gottingen ·	51	31	50	9 56 30 E.
Berlin · ·	52	31	45	13 22 15 E.
Dublin · ·	53	23	13	6 20 30 W.
Edinburgh	55	57	57	3 10 21 W.
Upsal · ·	59	51	30	17 39 0 E.
Petersbur.	59	56	23	30 18 45 E.
Pekin · · ·	39	54	13	116 27 45 E.

The Antiquity of astronomy depends on the following data:—

1. The Hindoos assert the record of observations 3102 years before the Christian æra, *i. e.* 754 years before Moses's deluge in 2348 B. C.; and these observations agree with the most accurate modern tables, including the corrections of refined theory.

2. The Chaldeans had made observations which extended 1903 years before the taking of Babylon by Alexander, *i. e.* 2233 B. C. or within 100 years of Moses's deluge.

3. The Egyptians claimed 48,853 years of observations, which, by mistake, may have been called years, by Diodorus, instead of moons, and if so, this gives a date of 3,900 years B. C.

4. Then the Persians go back to the period when Aldebaran was on the equinox, now advanced two signs 7° 20′, which would have been in 3018 B. C.)

5. The Chinese assert that Fohi, in 2752 B. C., construoted astronomical tables, and that in 2697 Hoangti made an armillary sphere, and they record a conjunction of the five planets, which really happened in 2449.

6. The zodiac of Tentyra places the equinox in the middle of Aquarius, which indicates an advance of two signs 15° since its formation, and carries us back to 3600 B. C.

The science must also have been long progressing to a state in which it recorded these formal observations.

The earliest Hindoos practised trigonometry and sexagecimal arithmetic, and taught that the earth was spherical, turned on its axis, &c. They then

took latitudes and longitudes, knew the diameter of the earth to be 1600 yojanas, and the moon's distance 51,370, or 32 diameters.

In one yug they say the Sun, Mercury, and Venus, or Surya, Budha, and Sucra, make 4,320,000 revolutions.

The Hindoos call

The Sun	Surya,
Mercury	Budha,
Venus	Sucra,
Mars	Mangala,
Jupiter...............	Vrihaspati,
Saturn...............	Sani,
Moon	Chandra.

It seems probable that Aristarchus readjusted the zodaical signs, for the present advance of 29 degrees carries us back 2088 years, near the age of Aristarchus. The Balance and Virgo determine the equinox and harvest, and accord beyond all question.

Bailly maintains, from oriental records, that astronomy was cultivated in Egypt and Chaldea 2800 B. C. In Persia 3209. In India 3101, and in China 2952.

Job, Hesiod, and Homer mention several of the constellations.

The Royal Library at Paris contains a Chinese chart of the heavens, made about 600 B. C., in which 1460 stars are correctly inserted.

Besides the Pekin Gazette, the government publish an annual calendar, in which the lucky and unlucky days are inserted, and what may be done, and what refrained on those days. In their astronomy they divide the zodiac into 12 signs and 28 constellations; and time into periods of 60 years, instead of our centuries, and into revolutions of 10,800 years, introduced by Taotse 1500 B. C., and evidently referring to the revolution of the line of Apsides, when the Perihelion and Aphelion interchange their positions.

They were also very ancient topographers; we refer map-making to the fourteenth century; but there exists a map of China made 1000 B. C., which nearly accords with the actual surveys made by the Jesuits in 1700 A. C.

The astrologers of Babylon are stated to have presented Alexander with astronomical observations during 430,000 years. But this was likely to be an error of ignorant reporters, who mistook a celestial period fixed by multiplication for an observation. Twenty revolutions of the line of Apsides make up this period, and perhaps they, with the Hindoos, might maintain there had been 20, as matter of tradition or conjecture; or it means moons or days.

The Egyptians alleged that, in 48,853 years, (probably moons) the period from Vulcan to Alexander, they had accurately observed 373 eclipses of the sun, and 832 of the moon.

The Persian astronomers recorded their observations 3000 years before Christ, when Aldebaran and Antares were in the equinoxes, and Regulus and the Southern Fish in the solstices, or exactly N. S. E. and W., which agrees with the precession of the equinoxes in that period of time.

According to the great work, the Chinese *Shoo-king*, the periods of the planets, and the Sun and Moon, were well known to the Chinese in the reign of Yao 2357 B. C. Their observations, however, are mere records; and they have no tables by which to anticipate phenomena. They represent the Sun by a bud, and the Moon by a rabbit. They call Saturn Too, Earth fire, Jupiter Mo, and Mars Ho, Venus Ken (metal), and Mercury Shoog (water). The stars are divided like the provinces of the empire. The Zodiac has 28 constellations and the equator has 12 parts, of 30°. Their public astrology is very similar to that which appears in our Moore's Almanac.

The Arabian astronomers, under the Caliphs in 995, had a quadrant of 21 feet 8 inches radius, and a sextant 57 feet 9 inches radius.

The Phœnicians sailed by the stars in the Great and Little Bear.

In 2752 Fohi made astronomical tables, and in 2697, the fixity of the Polar Star led to the invention of the armillary sphere by Ynchi. In 2513 Chueni began his reign, and in his time the Chinese record the visible conjunction of five planets, which, by calculation, actually took place in 2449. All the fundamental elements of astronomical calculation appear to have been acquired by them long before the Christian era. In the eighth century B. C. they had a catalogue of 2500 stars. They divided the ecliptic into 365.25 parts, and made the obliquity 24°, which carries back the period 41 centuries, the secular diminution being 50″, or to 2200 B C.

The Indian tables of great antiquity make the tropical year within 1′ 53″ of our best tables. And other tables, equally accurate, appear to Bailly, Playfair, and other authorities, to have been constructed 3102 B. C. One of their zodiacs places Aldebaran 40′ before the vernal equinox; which carries it back to 3163 B. C. Other coincidences are astonishing, and prove the length of their observations by the perfection of their instruments in our epoch of Adam. Thus the place of the sun agrees with our best tables within 46′ 54″, and the moon within 37′, yet our tables include various minute ano-

malies of recent discovery. The planets equally agree in minute particulars.

Democritus taught that the milky way was caused by innumerable stars. Nicetas and others taught the diurnal motion; while Pythagoras, who had been in India, taught the two-fold motions, and the modern system of the world. He ascribed eclipses to shadows, and arranged the planets as in the Copernican system. The later system of Ptolomy was his attempted improvement, or the Egyptian system.

Pytheas, in 330 B. C., made the obliquity 23° 50′, and mentions the connection of the tides with the moon.

Eratosthenes, in 276 B. C., made the obliquity 23° 51′ 20″. He and Hipparchus in the same age, Ptolomy in 130, the Arabians in 800 and 900, and Ulugh Begh, in 1440, perfected the outlines of the science, and prepared the way for Copernicus, who, in 1543, on the day of his death, allowed his system to appear. It is the system of the Chaldeans, and nearly the same that was taught by Pythagoras, and will be believed by wise men to the end of the world.

Tycho, Kepler, Galileo, Hevelius, Descartes, Gassendi, Newton, Huygens, Flamstead, Hook, and Halley, distinguished the next century, and though Bacon opposed himself to Copernicus, and preferred the Ptolemaic system and astrology, yet it triumphed; and its adoption has rendered astronomy the most perfect of the sciences. The hypothesis of Newton, formed in 1666, that bodies fall to the earth by *attraction*, sustained by three other hypotheses about a universal gravitation, a projectile force in the planets, and a vacuum in space, gave systematic character to the science. But Kepler's approximate law, that the squares of the times are as the cubes of the distances, and Fermat and Hooke's law, that the forces are as the squares of the distances, gave precision and plausibility to the whole.

Copernicus describes attraction as an appetite or appetence, which the Creator impressed on all parts of matter! Kepler describes it as a corporeal and mutual affection tending to union; and Newton as an original power, which restores lost motion.

Of course, these ideas were truths in ages when the highest authorities in church and state burnt men and women daily, for witchcraft and conjuration; but we now believe that all matter is essentially inert, and has no power except mechanical, derived, and connected power, equal and similar, in origin, cause, and effects. The power of '*presto*' is no longer recognised by vulgar sense or true philosophy, and men demand the determination of more definite causes than those expressed by such vague terms as attraction, repulsion, or weight, even though mystified by being ingeniously translated into so high-sounding a Latinism as *gravitation*.

An industrious examination of the motions of nature prove incontestibly that complicate and involved motions produce all the resulting phenomena of matter, great and small; and the adoption of any cause not mechanical, therefore, disgraces philosophy, and offends the common-sense of the world. In a Book of Facts it is, however, proper to state, that the wordy or witchcraft systems still prevail in every university, and in every corporate philosophical society in Europe and America, and no errors were ever more pugnaciously asserted.

These ancient theories in a special manner infect astronomy. It is even roundly asserted, that because diagrams illustrate this science, the powers obtruded by fancy are also demonstrated; but no assertion can be more universally false, since geometry affects and includes nothing whatever about qualities and powers of lines and figures, but is strictly *abstract*; and for this cause alone is true. No legitimate demonstration ever was made, or can be formed, about any of the fashionable doctrines relative to universal gravitation, forces inversely as the square of the distance, original projectile force, force of inertia, &c. &c. It is altogether an empirical abuse of the sacred name of Geometry to pretend any thing of the kind. On the contrary, Geometry is closely allied to every step in mechanics, from the lever to the most complicated human machinery, and the far more sublime machinery of nature; but it demands simple, connected, continuous, and obvious forces of impulse or protrusion, and no fancies or gratuitous powers.

The elements of the first astronomical quantity, the distance of the sun, are very trite and accessible, being in harmony with the motions of the earth. The motion or fall of a body, which, at every angle of the force and in opposed positions, is a mean over the earth of 16.08728 feet per second, log. 1.2064822. The velocity of the equator per second, which, at 69.0805 miles to a degree, is 1523.95 feet; but this is the velocity of the mere line of the equator, and relations of an equator to the revolving surface of a whole sphere are as 1 to 4. Hence $1523.95 \times 4 = 6095.8$ is the accurate expression for the velocity of the whole sphere, considered as an *inverse* force to the orbit motion, it being a deflection from the line of

the orbit-motion, which, by action and reaction, renders it a central force.

Its log. is 3.785031. The law is $\frac{O}{4\,R} = F$; and therefore $O = 4\,R \times F$, which last are given.

Then Log. 1.206482 = 16.08728
3.785031 = 6095.8 .

4.991513 = 98065

which 98065 is the accurately-determined orbit velocity in feet per second.

Then there are 31,471,114 seconds in a year. Log. 7.497913.

Then 4.991513 = 98065 feet
7.497913 = 31,471, 114″

12.489426 = Orbit in feet

Then dividing by 5,280 feet in a mile,
12.489426
3.722634=5280

Miles in orbit, 8.766792=584510,000.

And dividing this by 6.28318, the ratio of the circle to the radius,
8.766792
0.798180=6.28318

Mn. dist. of sun 7.968612=93.027640 mils.

Any tyro in Arithmetic may go through this easy calculation.

There was, however, no harm in observing the transit of Venus in 1769. It serves to verify the above, as the arithmetic of nature; but so small an angle cannot be approximated within a second, and astronomers long differed between 8 and 9 seconds, but at length agree on 8″.75 as the angle of the earth's semi-diameter at the sun.

Then the sine of 1 minute being 291, that for one second is $\frac{291}{60}$ or 4.85, the sine of 8 being 38.8, and of 9 being 43.65. As often, therefore, as these go in the radius, 1 million, so many semidiameters is there between the sun and earth, *i. e.* at 8 seconds 25,773, and at 9 seconds 22,910. The angle is however agreed to be 8.75 seconds, whose sine is 42.4375, and this in 1 million goes 23,564, usually taken 23,578. The semidiameter of the earth, either 360 × 68.732 = 24743, or 360 × 69.0805 = 24869, gives respectively 92,896,000, or 93,266,400 as the mean distance.

And the latter measure of the degree applied to the Editor's theory of motion gives the distance 93,027,640 miles, as above.

Then to complete this problem, as the earth, owing to its definite magnitude, performs in fact two orbits, one on each side its centre, so mechanical compensation is obtained in an ellipsis or egg-form at proportionate distances; which observation on the varied size of the sun determines to be 0.03370636 of the whole, that is 3,135,607 miles difference between the perihelion and aphelion distances, or 1,567,803 less, and more than the mean. All planets have elliptical orbits for the same reason, for only a physical point could by a natural force perform a true circle.

The distances of the several planets from the sun have hitherto been determined by a law deduced from trials by Kepler, by which he inferred that $T^2 : t^2 :: D^3$ to d^3. He was very near the truth, for the law is $T : t :: D^{1\cdot5708} : d^{1\cdot5708}$, and as by squaring all the terms, we do not alter the proportions, it may be expressed, as $T^2 : t^2 :: D^{3\cdot1416} : d^{3\cdot1416}$. 1.5708 is the area of a quadrant, and 3.1416 of a semi-circle, and all the functions of these motions are complete in the quadrant or the semi-circle.

Kepler's law has not hitherto been understood; but, it arises from the Times being *involved* with forces as circles; and then the force, or power, being first extracted, the root is the circle in the usual relations of circles to the radii. The power of the force in a quadrant is the area 1.5708, and the Time is the Circle $^{15\cdot708}$; that is $T = C^{1\cdot5708}$, therefore $T^{\frac{1}{1\cdot5708}} = C$. The true ratio, therefore, is $T^{\frac{1}{1\cdot5708}} : t^{\frac{1}{1\cdot5708}} :: D : d$. But, to give an expression like Kepler's, since $\frac{1}{1\cdot5708} = \frac{1}{3\cdot1416}$, and as the denominator of the co-efficient may be carried to the last terms without changing the proportion, T^2 is to t^2 as $D^{3\cdot1416}$ to $d^{3\cdot1416}$. The roots and powers are, of course, attained by dividing or multiplying the logarithms.

The two forces which move the planets are *the deflective force* from the line of the sun's motion, produced by the sun's rotation on his axis, and around the centre of momentum of the system which carry or urge the medium of space into circles, and these act tangent-wise on the planets as 1.2114; and *the returning force* by which they follow the sun in the whole moving system as 1—between the two performing a resultant motion of 1.5708 in one quadrant, and a return to the line of solar motion in the next quadrant.

The motions of the planets round the sun exactly resemble that of a stone carried round on the earth's surface. The motions, or causes, being exactly analogous.

Since neither the sun nor any matter has power without motion, so in the sun's great power we have evidence of great *progressive motion*. Then the rotation of 6619 feet per second demands a velocity of 26,476 feet, to render the centripetal merely equal to the centrifugal force. Again, rotation is itself evidence of falling from a tangent into an orbit. Herschel, by observation, thought the son somehow moved towards Hercules, with the velocity of the earth, or 100,000 feet per second. It is therefore now inferred, that the sun actually describes a great orbit round some undiscriminated centre; and it is analogically estimated with three degrees of central force. With equal centripetal and centrifugal at 162,865 millions; with 4.02 feet of fall per second at 654,722 millions; or, with 16.087 of fall at 2,619,750 millions; performed in each case in exactly 25,868 years, the period of the precession of the eqoinoxes, which, it is surmised, is very nearly, or a mean of the true period of the solar orbit.

Extracting the $^{1\cdot5708}$ power of the resultaot force, measured by the Times in the various orbits, Sir R. Phillips determines the root of the earth's days to be 42.798; and then reducing the whole to this, as 1 for the simplest staadard, the following are the roots of the circles (expressed in Times) as multipliers, and the corresponding true distances of all the planets:—

Roots.		*Distance.*
☿	0.404	37,582,500
♀	0.734	68,265,463
⊕	1.000	93,026,240
♂	1.495	139,084,500
♃	4.829	449,215,210
♄	8.616	801,542,000
♅	16.792	1562,136,140

Thus this subject, by the simplest theory, is divested of all mystery, and these accurate results are attained on pure mechanical principles, of equal momenta from matter, constantly varying as motion; without any gratuitous law of inverse forces, or any impossible force of attraction.

The 1.5708th power, extracted as above, is the diagonal of the two nearly equal forces which produce every orbit. Thus, as a diagonal of equal forces, the co-efficient would be 1.4142 as a chord, but peculiarities in the tangent force raise it to 1.5708, as the constant inverse power of the strait distance involved in the production of curved orbits and their times, proved, as matter of fact, by the resultant proportion of every mean quadrant to the radius nearly of 1.5708 to 1. Neither Kepler's equal areas, in equal times, nor Newton's trite corollary, or measure of them, in his subduplicate ratio, are tenable.

The area of the orbit of a planet is exactly equal to the rectangle or product of all its motions. It is $= \frac{C^2}{4 \times 3.1416}$, or $\frac{C\,D}{4}$, or $\frac{D^2}{0.7854}$; and either of these is exactly equal to the product of the rotation of the sphere 24869×4; into the days in a year, 365.256377; into the orbit.

This product is then to be multiplied by the fraction $\frac{16\ 08728}{12\ 56634}$, the numerator being the central force generated, and the denominator being the circle $3.1416 \times 4 \therefore = 1.280183$.

The log. of the area is 16.434674 and this is equal to $R \times T \times O \times 5.120632$:

Rotation mean,	2.4869	= 4.395658
Time,	365.256377	= 2.562592
Orbit,	584 510000	= 8.766792
	4×1.280183	= 0.709332
Q. E. D.		16.434374

The 1st, 2d, and 4th lines are exactly equal to distance 93.027640, whose log. is 7.968612. And $R \times T \times 5.12$ is equal to distance, in the earth and all planets.

The determinations of La Grange and La Place, that the obliquity of the earth's axis varies between 27° and 21°, is founded on an erroneous hypothesis of the canse. The original cause of great obliquity was the oneqnal distribution of the granite and solid masses, and the present cause of diminution is the gradual abrading and distribution of the original inequality by the action of air, water, and rotation. Their elaborate determinations about the eccentricity of the orbit, and the progression of the Apsides, are equally erroneous, owing to their adoption of unphilosophical data about attraction, &c. The true cause is the substantial bulk of the earth by which the outer vertical hemisphere performs a greater orbit than the inner, and the inequality is compensated by variation of distance. A mean, or circular orbit, is such as would accord with the revolution of a point, but a physical mechanical orbit is in excess or diminution as the excess or diminution prevails of the forces of the two vertical hemispheres. No other than an eccentric orbit could take place in a free definite bulk, which balances and adjusts its own motions.

The earth moves in its orbit about 98065 feet per second, which, in a ratio with one diurnal rotation, may be taken as a straight line, then this rotation derived from the other is 1523.95 feet. Then, taking O as orbit, R as rotation,

and F as fall, we have $\frac{O}{R} = F = 64.34912$ for the centripetal force of a body at the equator, taken as a line only. But the rotation of a line, or hoop, being simply as the radius only, that of an equatorial plane is as the square, or area, of the diameter of the equatorial plane, and that of the whole revolving sphere is four times this area; consequently $\frac{O}{4\,R} = F$, or 16.08728, which is known, by experiment, to be the mean fall all over the earth per second. For other times, the continuous force produces acceleration by Galileo's law, as the square of the number of seconds, because the moved surfaces are as the squares of the equal angles in equal times.

Of course the equation $\frac{O}{4\,R} = F$ applies to all planets, and is local and special in each; and F has therefore no connexion with any alledged property of matter, called the attraction of universal gravitation.

The centripetal effect is the same in the parallels as at the equator, because the force is as the square of the radius, and this is equal to the square of the sine and cosine every where; while their diagonals are the common radii. At the poles, the sine becomes the radius; and, at the equator, the cosine. The equation for different latitudes is $V \times \frac{R}{cos.\ lat.} \times 4$. All the parts of the *same* sphere must be equally affected, and all the actions and re-actions directed to and from the common centre, as in all moving spheres.

$F \times R\ (4\,R)$ being $= O$, so F and R are the sides of a rectangle equal to O; and as $F : \sqrt{O} :: \sqrt{O} : R$, *i. e.* $16.08728 : 313.11 :: 313.5 : 6095.8$. The first term being the known fall of a body; the second and third, the square root of 98065, the mean orbit motion per second; and, the fourth, the rotative force of the whole surface.

As it is with bodies on the earth, so it is, by exact analogy, with the moon. The earth's momentum is the rectangle of its relative bulk to the moon 47.0143, by its own velocity 98.065 feet per second $= 4609000$; and this rectangle is exactly equal to the square of the two equal forces which produce the moon's true mean orbit motion of 3371.35 per second, found, by dividing 7958 millions of feet in orbit, by 2360591 seconds. For $\sqrt{47.0143 \times 98065} = 2146.9 =$ the sides of the said square, and $=$ the equal tangent and central force at right angles. Then 2146.9×1.5708 for the subtended equivalent arc, gives 3371.35 feet, exactly.

The Newtonian law of gravitation is alledged to be *proved* by the fall of the moon from her tangent 16 feet in a minute. But a slight examination will prove that this is a fatal mistake. The moon falls through her radius in every quadrant. This radius is 240,000 miles, or 1,267,200,000 feet, which, divided by 9835.75 minutes in her sidereal quadrant, gives 128,836 feet for her mean fall per minute; or by 10631 minutes, in her synodical quadrant, gives 119,200 feet for her mean fall per minute, now and for ever! A fall of 16 feet per minute would confer 600 years on a lunation! Yet this error is the *key-stone* of the prevailing system.

Kepler promulgated three laws of planetary motion. 1. That the squares of the times are as the cubes of the distances. 2. That a planet moves through equal areas in equal times; and, 3. That the planets describe elliptical orbits with the sun in one of the foci.

The length of the second's pendulum was determined by Hall and Forster, at the Gallipagos, to be 39.01717 inches. This gives the ellipticity of the earth one 284.98th, in connection with Kater's observations in England, and one 292.14th, in relation to Sabine's, at Melville's Island.

At San Blas, 21° 30′ 25″ N. the same gentlemen determined the length to be 39.03776, the mean ellipticity one 313.55th.

Two sets of observations at Rio Janeiro, lat. 22° 55′ 22″ S. gave 39.01206 inches, and the ellipticity a 302.37th.

The vibrations of an invariable pendulum, in July 1820, at London, 83 feet above the sea, in lat. 51° 31′ 8″.4, bar. 68, on a mean of seven days, were 86229 78, in 24 hours; which, in vacuo, at the sea's level, would be 86235.98. Then, with the same pendulum, the mean of 12 days' vibrations, at the Gallipagos, was 86095.56 by the stars, and 86095.49 by the sun.

The seconds pendulum, at London, being 39.1392, the equatorial pendulum is 39.017190.

At San Blas, the mean of seven days was 86119.01 by the stars, and .02 by the sun. And at Rio it was 86125.48 and .61.

On repeating the experiments in August 1823, at London, the excess was 0.97 over those in July 1820. The pendulum had oxidated in the interval, but being cleaned, the difference was but 0.24.

Brisbane, at Paramatta, New South Wales, south lat. 33° 48′ 43″, east long. 151° 0′ 15″, between Aug. 27 and Sept. 4, 1822, observed, with an invariable pendulum, a corrected mean of 86021.59

vibrations per day; and Dunlop, in the same place, made it 86022.21; which, compared with Kater's observations by the pendulum, at London, of 86090.17, gives 39.07696 inches for the seconds pendulum at Paramatta.

The earth moves in its orbit 1,600206.3 miles per solar day of mean motion; 2667.1555 per hour, and 111.1309 per minute. But, in a sidereal day, or one perfect rotation from star to star, which is 235.9 seconds less than the solar day, the motion per second is 18.572462 miles, or 98065 feet per second.

The 235.9 seconds which the stars gain on the sun every day, amount, in 365.2563773 days, to 86163 seconds, or a sidereal day; and this is the cause of the precession of the equinoxes, since the earth thereby accelerates its arrival at the equinoctial points, as orbit points in relation to the sun. The exact number of miles in 50″.1, at the earth's orbit, is 22382, and this carried to the ecliptic, is 24869 = 1 rotation, or 86163 seconds, gained in the year by the earth on the stars, as to the sun, and the orbit points of the nodes. It is the same with the moon; it gains on its orbit in like manner, by one rotation, a quantity exactly equal to its own circumference, in every lanation, and hence its nodes go entirely round in nineteen years.

The square root of the earth's orbit motion, $\sqrt{98065} = 313$, is a mean proportional between the rotation and the fall of a body. The moon's orbit motion is a mean proportional of the earth's balk by the earth's orbit motion. The orbits of the planets are a mean proportional of the sun's bulk by the sun's progressive velocity.

Disturbances are consequences of interference with forces distributed from one centre; but speedily corrected by the paramount influence of a great balance-wheel like the sun.

The nautical almanac makes the daily motion of the earth, on Dec. 31, 1832, in perihelion 61′ 10″, and on July 1, in aphelion 57′ 11″. The semidiameter of the sun in the first 16′ 17″.76, and in the second 15′ 45″.53. The log. of distances 9.9926580 and 0.0072161. The mean distance is on April 1 and Oct. 2.

The oblate spheroidal figure of the earth varies the ratio of the surface from 4 to 1, to 3.98100 to 1.

The angle of 23° 27′ made by the ecliptic with the equator determines all the zones and circles on the globe. Thus, the tropics are 23° 27′ on each side the equator; and the polar arctic and antarctic circles are 23° 27′ from the north and south poles. The middle regions 90—46 54, or 43° 6′ are the temperate zones.

The solstitial points are the first degrees of Cancer and Capricorn; and the equinoxial points are the first degrees of Aries and Libra.

The experiments at Schehallien, &c. which determined the mean density of the earth four and a half times that of water, are founded on the assumption that inert bodies attract one another; but as a body inclines to a mountain, on the very same principle that corks float towards bungs, their intercepted atmospheric pressure, the data are inferred to be grossly fallacious.

Twilight lasts till the sun is 18 degrees below the horizon, when the solar rays are reflected from a height of 44 miles. The horizontal refraction is 30′ 51″, nearly the diameter of the sun; so that the sun has set when his body touches the horizon to the eye.

Light is 8′ 8″ in its transmission through the distance from the sun to the earth, and in this time the earth in its orbit moves 20′ of a degree, creating an aberration from its true place.

The centripetal and centrifugal forces of the earth would, according to Ivory, balance each other at 25,000 miles high.

Motions, changes, and phenomena on the earth, or any planets, are entirely caused by the motions of the earth or planets, derived from them, and returned into them. The annual and diurnal motions create, cause, include, and absorb the entire events, progress, and history of all organized beings, their motions and phenomena being mere deflections of the motions of the planet with which they are connected. And the motions of the sun create the motions of all the planets.

The perihelion of the earth, at 1° 43′ 10.8″ in a century, or 61.8″ per annum, makes a revolution in 20931 years.

The equinoxes recede 50.1″ per annum, or 1° 23′ 30″ in a century, and make a revolution in 25,868 years.

The Nautical Almanac makes the mean obliquity on Jan. 1, 1832, 23° 27′ 41″.7; and 1833, 23° 27′ 41″ 3, *i. e.* the decrease is only 0″.4 per annum, or 40 seconds per century.

La Grange calculates on theory that the obliquity of the ecliptic has diminished 2000 years, and will diminish 2000 more, and Schubert determines its limits at 20° 34′ and 27° 48′.

The obliquity of the ecliptic varies above half a second per annum, or from 50 to 60 seconds in a century. Hipparchus fixed it at 23° 51′ 20″, and it is now 23° 27′ 30″, making a difference of 23′ 50″ in nearly 2000 years. The cause is the diminished inequality distribution of land and water on the globe.

The diameters of the bodies in the Solar System are, the Sun 883246 miles; Mercury 3224; Venus 7687; the Earth 7916; Moon 2200; Mars 4189; Ceres

and Pallas uncertain; Juno 1425; Vesta 238; Jupiter 89170; Saturn 79042; Herschel 35112.

Their distances, by Kepler's law, $D^3 : d^3 :: P^2 : p^2$ are, Mercury 37; Venus 68; Earth 95; Mars 144; Ceres 263; Pallas, 266; Juno 252; Vesta 225; Jupiter 490; Saturn 900; Herschel, 1800 millions.

The distances, by the Editor's new law, are given in a previous column.

The inclinations of their orbits to the plane of the ecliptic is—

	°	′	″
Mercury	7	0	0
Venus	3	23	35
Moon	5	9	3
Mars	1	51	0
Ceres	10	37	0
Pallas	34	50	40
Juno, uncertain			
Vesta	7	8	46
Jupiter	1	18	56
Saturn	2	29	50
Herschel	0	46	20
Inclination of the Sun's axis,	82	44	0
Moon's	88	17	0

The line of Apsides, in 100 years, moves—

	°	′	″
In Mercury	1	33	45
In Venus	1	21	0
Earth	1	43	10 8
Mars	1	51	40
Jupiter	1	34	33
Saturn	1	50	7
Herschel	1	29	2

Great equation of centre—

	°	′	″
Mercury	28	40	0
Venus	47	20	0
Earth	1	55	30.0
Mars	10	40	40
Pallas	28	25	0
Jupiter	5	30	38
Saturn	6	26	42
Herschel	5	27	16

Periods:	yrs.	days.	h.	m.	s.
Mercury	0	87	23	15	43
Venus	0	224	16	49	10
Earth	0	365	6	9	12
Mars	1	321	23	15	44
Vesta	3	240	4	55	1
Juno	4	130	23	57	7
Ceres	4	221	13	56	9
Pallas	4	221	17	0	5
Jupiter	11	315	14	27	11
Saturn	29	174	1	51	11
Herschel	83	150	18	0	0

Eccentricity, half the major axis being 1: Mercury, .2055; Venus, .00695; Earth, .01685; Mars, .09313; Vesta, .093322; Juno, .2549; Ceres, .07835; Pallas, .24538; Jupiter, .048178; Saturn, .056168; Herschel, .04667.

Rotation on axis—	days.	h.	m.	s.
Sun	25	14	8	0
Mercury	0	24	5	0
Venus	0	23	29	59
Earth	0	23	56	4
Mars	0	24	39	22
Jupiter	0	9	56	0
Saturn	0	10	16	2

The apparent diameter at the Earth of Pallas, is half a second; of Juno, 3″; and of Vesta, half a second; Ceres varies from 1″ to 6″; Herschel is $3\frac{1}{4}$″; Mercury, 10″; Saturn, 18″; Mars, 27″; Jupiter, 39″; and Venus, 58″.

The Newtonian theory assumes that the matter of the planets vary in density, thus—Water being 1; the Sun is $1\frac{2}{13}$; Mercury, $9\frac{1}{6}$; Venus, $5\frac{11}{15}$; the Earth, $4\frac{1}{4}$; Mars, $3\frac{2}{7}$; Jupiter, $1\frac{1}{24}$, or equal to water; Saturn, $\frac{13}{32}$, rather heavier than cork, and Herschel, $\frac{99}{100}$, equal to water. Others reasonably alledge, that all planetary matter must be of average density, and the new mechanical theory finds an exact accordance on the principle of equal density.

The annual regression of the Planets' Nodes: De Lagrange makes ☿ = 8″ 98, ♀ = 19″.5, ♂ = 25″.79, ♃ = 19″.34, and ♄ = 20″.93. Le Lande's makes the progressive long, as follow: ☿ = 43″, ♀ = 31″, ♂ = 27″, ♃ = 36″, ♄ = 32″, and ♅ = 15″. Then, if we take the precession of the equinoxes = 50″, the regressions of the nodes will be 7″, 10″, 23″, 14″, 18″, and 35″, respectively.

Mars and Mercury are the most eccentric of the planets; that of Mars being 1-tenth, and that of Mercury 1-fifth nearly. Juno and Pallas are 1-fourth.

The period of a planet which moves but 500 feet in a second, would be 10 millions of years, and its distance 2,400,000 millions of miles, or $\frac{1}{14}$ the distance of the nearest fixed stars.

Herschel conceives the sun and planets to have a general motion, with relation to the fixed stars, at the rate of the earth's motion in its orbit; but at this rate, if the distance of the stars is 200,000 times that of the diameter of the earth's orbit, the sun would be 60,000 years in moving over the distance of the nearest fixed star.

If the planets were in conjunction at any time; in the period of 280,000 years they would be very nearly in conjunction again.

	Revolutions.		Seconds.
☿ ...	1,162,577	in	8,836,185,098,921
♀ ...	455,122	—	8,835,595,689,448
⊕ ...	280,000	—	8,835,940,680,000
♂ ...	148,878	—	8,835,946,519,500
♃ ...	23,616	—	8,835,946,544,448
♄ ...	9,516	—	8,835,046,558,608

The mean motion of the Nodes of the seven planets is 50° 5″ in a century, making a mean revolution in 36,558 years.

If all the known planets were assembled in one, it would be the 557th of the sun; and with equal forces it would be 590 millions of miles distant.

Lagrange demonstrated, on the theory of gravitation, that the inequalities of the planetary motions are periodical. The lines of apsides and the periods being supposed constant.

The planet Herschel was discovered with a five-foot achromatic telescope, on the 13th of March, 1781; and though its distance is 1,600 or 1,800 millions of miles, yet, if the distance of the nearest fixed star is 36,000,000 millions, and the mid-distance 18,000,000 millions, there is 10,000 times the distance of Herschel for 10,000 planets equally distant, from Herschel to the Sun.

Saturn's ring is double, and the nearest is three times as broad as the other, one being 20,000 miles broad and the other 7,200, while the space between them is 2,839 miles.

The exterior ring is 205,000 miles in diameter. The inner ring is 33,000 miles from the body of Saturn. It is said to rotate in 11h. 16m. and the outer part in 17h. 10m., but Schroeter doubts this. La Place is very hypothetical on this and other subjects, and therefore few of his calculations are to be relied on. The accuracy of mathematical results depends on the *rigorous* accuracy of the hypothesis applied, and La Place is generally absurd, and very superstitious. Saturn swells towards the Poles, and the longest diameter is at 43° 20′, and to the equatorial as 36° to 35°, while the polar is 32°. This seems owing to the central action of the rings, for this vast planet turns in 10h. 16m., and the ring seems like the middle parts thrown off by a centrifugal force.

Five of Saturn's satellites were discovered in the 17th century, and the sixth and seventh by Herschel in 1789.

The major axis of Saturn's ring in 1833, subtends an angle of from 37 to 45 seconds.

The minor axis of Saturn's ring was, in April, 1832, but 4″.54, and on September 30, but 0″.01, the Major axis being 43″.2 and 36″.92; and, in 1833, the minor, from March to July, is less than 1″, and in April, May, and June, 0″, and invisible, the Major being from 45″ to 40″.

When the elongation of Venus is 39° 44′ between its inferior conjunction and greatest elongation, it appears brightest; for then, though its phasis be but the 53-200ths of a circle, it is so much nearer the earth than in its superior conjunction, when it appears with a perfect disc, that the want of surface is more than compensated by intense light. In that situation, Venus is often seen by the unassisted eye in broad day-light. When Venus is to the west of the sun, it rises before the sun, and is called a morning star, this appearance continuing about 290 days together;—when it is to the east of the sun, it sets after, and is called an evening star, about the same period of 290 days.

Spots have been seen on Venus; but Herschel saw none, only a dark and enlightened atmosphere. Schroeter saw a mountain 22 miles high, another 19, and two others 11. He makes the rotation 23h. 20′ 54″. Many have believed that they have seen a satellite, distant 66½ semidiameters.

Venus never goes above 48° from the sun. Both Mercury and Venus have phases like the moon.

There will be no transit of Venus till Dec. 8, 1874; but another, Dec. 6, 1882. No other till 2004.

Venus and Mercury, in approaching the body of the sun at distances from 65′ to 46′, display no refraction of a local solar atmosphere. So, also, Jupiter's satellites have no refraction when close to his body.

When Venus is brightest, and at the same time at its greatest north latitude, it can then be seen by the naked eye at any time of the day. This happens once in about 8 years.—*Vince.*

Mercury, viewed with a telescope, appears with phases similar to the moon. The density of solar heat, which is in the same proportion as light, is 7 times as great in Mercury as with us; so that water there would form steam, and all bodies be exposed to a heat of 500° or 600°.

Herschel could see no spots on Mercury; but Schroeter alledges that he did, and saw mountains 10 miles high. He considers the rotation as 24½ days.

Mercury never moves above 28° from the sun, and therefore never rises or sets above 1 h. 50 min. before or after the sun, and is seldom seen.

The planets being acted up by the common force of the sun, they often interfere on the same side with the sun's force on that side, and this begets irregularity or disturbance, whimsically called their own mutual attractions.

At Jupiter the earth emerges but 12° from the sun, Mars 17°, Venus 8°, and Mercury but 4°. Of course, all invisible.

The diameter of the Satellites of Jupiter are 1″.015; 0″.911; 1″.488, and 1.″273. Jupiter's Satellites are from 6 to 26 of his semi-diameters distant; Saturn's from 3 to 20 and 1 of 59; Herschel's 13 to 45 and 1 of 91.

There will be transits of Mercury,

Nov. 7, 1835
May 8, 1845
Nov. 9, 1848
Nov. 11, 1861
Nov. 4, 1868

The 17 satellites revolve as under:

	♃	♄	♅
	d. h. m.	*d. h. m.*	*d. h. m.*
First ...	1 18 28	0 22 37	5 21 25
Second	3 13 14	1 8 53	8 17 1
Third ...	7 3 43	1 21 18	10 23 4
Fourth	16 16 32	2 17 45	13 11 5
Fifth ...	....	4 12 25	38 1 49
Sixth ...	....	15 22 41	107 16 40
Seventh	....	79 7 54	

The Satellites of Herschel revolve nearly perpendicular to our ecliptic.

The Sun is in the exact centre of the solar system, but the planets vary their distances by moving between the tangent force and the chordal force, every where governed by the sun's two motions. As a planet is not in two places at once, an orbit and focii are imaginary. The extreme distance of the Earth is to the least distance 1017 to 983, 1,000 being the mean distance. The orbit is in the exact form of an egg, and not an ellipse or section of a cone.

Herschel supposes the spots in the sun are mountains on its surface, perhaps above 300 miles high. On examining the sun with several powers from 90 to 500, the black spots seemed the opaque ground or body of the sun; and the luminous part an atmosphere, intercepted or broken. He concludes, that the sun has a very extensive atmosphere, more or less lucid and transparent. This atmosphere he thinks not less than 1,843, nor above 2,765 miles high. If one of the spots appears upon the eastern limb or edge of the sun's disc, it moves thence to the western edge in 13½ days; it then disappears, and, in about 13½ days more, is seen again upon the eastern edge; and so continues, completing its revolution in about 27 days.

Owing to the simultaneous motion of the earth, the real rotation of the sun is 25 *d.* 9 *h.* 56 *m.*

Herschel, Klugel, and Prevost, consider the sun as progressing in space towards the northern crown.

The zodical light is ascribed to the solar atmosphere, and to its condensation in the plane of the zodiac.

In 1779, Herschel measured a spot in the sun 50,000 miles in diameter. These spots cross the sun from east to west, and shew that the axis is inclined 3° 45′ to the eastward.

Spots in the sun have been seen to divide and separate in many parts. They, frequently, make notches in the sun's limb. When they disappear, they are succeeded by faculæ or bright spots. They are classed as openings, shallows, ridges, nodules, corrugations, indentations and pores.

The Sun is equal to 20,610,000 Mercurys, to 1,520,000 Vennses, to 1,388,000 Earths, 9,394,000 Mars, 973 Jupiters, 1399.4 Saturns, and 1595.5 Herschels.

The least hourly apparent motion of the sun (earth) is 2′ 23″, and the greatest 2′ 32.9″.

Then the diameter of the Sun being 883,246 miles, the equatorial rotation per second is 6,674 feet, (4 times that of the earth;) and this demands *an orbit velocity* of 64.35 × 66.74, to produce weight in the Sun equal to the earth's, or 429,500 feet per second.

The sun's declination, or the declination of the fifteenth degree of the signs, is as under:

	deg.	*min.*	*sec.*
♈ ♍ ♎ ♓	5	15	2
♉ ♌ ♏ ♒	16	21	20.6
♊ ♋ ♐ ♑	22	37	32.9

The length of the day, in latitude 49. 51, 53, and 55, for the above declinations is as under—

	hrs. ′	*h. ′*	*h. ′*
Lat. 49 ...	12.54	14 45	15.53
51 ...	12.56	14 58	16. 6
53 ...	13. 3	15.10	16.40
54 ...	13. 8	15.27	17. 4

Dr. Tiarks, being furnished by the Board of Longitude, in 1823, with 29 of their best chronometers, determined the longitude of Dover to be 5′.17″.54 E., Portsmouth observatory to be 4′.24″.77 W. Pendennis 20′.10″.85, and Madeira 67′.39″.08, *in time.*

Col. Lambton's measure of the Meridian in India, was from lat. 8.23.10 (Cape Comorin) to lat. 21.6 near Ellichpore, the longest line ever measured.

Many maps have been made of the Moon, and Ricciolus and Hivelius assigned names to the several parts, with latitude and longitude taken from lines drawn through the centre. One annular ridge, with a small central rock just S.W. of the centre, is called by one, Hipparchus, and by the other, Olympus. A large spot, just S. E. of the centre, is called Ptolemeus by one, and Mount Sipyln by the other. 10° 43′ E. and 43° S. is the deep brilliant cavity called Tycho, or Mount Sinai, the centre of all the radiations in the south hemisphere.

The height of the mountains in the moon is considerable; ten are 5 miles, or nearly; and eight are from 3 to 4

miles. Three of the hollows are from 3 to 4 miles; ten are from 2 to 3 miles, and as many are nearly 2 miles.

The dark parts are not supposed to be water, while the high parts are ridges of mountains or high lands. The brilliant spots are hollows sorroonded with high ridges, with a hill in their centre. This rough surface is considered as volcanic; and several observers, especially Herschel, have observed red spots like volcanoes. Of coorse, combustion bespeaks an atmosphere, and observations on the horns prove that there is one the third of a mile high, creating a twilight, and a rarer one nearly a mile higher.

Some moderns estimate the moon's atmosphere to be 1,658 miles high.

The mass of the moon is to that of the earth, per La Place, &c. as 1 to 60.79, per the tides on *theory*. Hutton's Density Theory makes it 1 to 71.

The moon's motions are accelerated 11 seconds in a centory; and in remote centories as 11 × by the sqnare of the number. Hence an eclipse 2,000 years ago reqnires 20 × 20 × 11 seconds of time to be allowed, or 1½ hour nearly.

The Chaldean period of 223 lunations, or 18 years, 11 days, 7 hoors, 42 minutes, brought the moon within 28′ 10″ of the same position again as to nodes and longitude; bot 6,890, or 557 years, 17¾ days, brings her within 1′ 41″, and then all her phenomena, eclipses, &c. &c. occur for the same period as before.

The moon's nodes or eqoinoxes go round the eliptic in 6,793 days, or in the Chaldean period, very nearly a circumference per lunation.

The moon is 24 minutes longer in performing her orbit when the earth is in its perihelion than its aphelion.

The *synodic* revolution of the moon is the time from one conjunction with the sun, or one new moon, to another. This exceeds the sidereal, and it is found that in 29d. 12h. 44′. 2″.8283 the moon is again in conjunction with the sun; the earth being 29° 6′ 20″.2 distant from the place of the former conjunction.

The exact interval of the moon's conjunctions with the son is 29.5305887 days.

The moon's diameter in apogee is 28′ 55.84″, and in perigee 33′ 56″. Her equatorial parallax varies also from 53′ to 62′.

The tables vary as to the distance of the moon, and the mode of taking the mean parallax. On principle, 56′.42″.36 is adopted for the parallax, and then the size and distance as follows:—

As sine 56′.42″.36	8.217379
Is to radius	10.
So is earth's semi-dia. 3958 .	3.597476
To distance	5 380097

Taking the apparent diameter 31′.26″ as generally agreed, though some call it 31′.29″

As radius	10.
To sine of 31′.26″ . . .	7.961089
So is distance . . .	5.380097
To diameter (2193.74 miles)	3.341186

Then the cubes of the diameter of the earth and moon are as 46.985 to 1.

The moon's orbit velocity per second is 3,372 feet, which agrees with La Place.

And if the earth's relative momentum is determined by multiplying its velocity 98,065 feet per second, by 46,985 its bulk, the square root of the prodnct is 2,146, the two lunar forces, which are *a mean proportional* of the earth's momentum.

If the 2,146 is squared, the square doubled, and the square root extracted, it is 3,372 feet, the moon's orbit velocity or hypothenuse of the two forces.

The earth's relative force is 49 985 × 98 065 = 4.607.600. The moon's force is 3.372 × 1 or the 1,366th. Then 2,146, the operative force, is equal to 1366 × 1.5708; and 2146 × 1.5708 = 3372.

Conseqoently

$$1366 \text{ or } \frac{4607600}{3372} \times 1.5708^2 = 3372^2.$$

And the bulk of the earth into its velocity, and 1.5708^2 the bulk of the moon into the square of its velocity.

Curious Harmonies.

In fine, it appears that the moon's central and centrifugal forces are *exactly* the square root of the earth's force; for, the square root of 4608000, the earth's force (46.99 × 98065) is 2146.53. Then doubling the square of this, as 2 sides of a right-angled triangle, and extracting the root, we get 3035.8 as the strait hypothenuse, or chord of the lunar arc for one second. And this by 1.110757, the ratio of an arc to its chord 1, gives 3372 for the moon's orbit velocity in a second.

Distance mingles no otherwise than as it affects 46.99, *i. e.* as the sine of the apparent angle. It is the forces which are in sub-duplicate ratio, as a resultant of their propagation in a gazeous medium.

When the new moon is within 18 degrees of the node, there is an eclipse of the sun; and when the full moon is within 12 degrees of the node, she will pass in the earth's shadow and be eclipsed.

The axis of the moon is inclined to the plane of her orbit 88° 17′.

The harvest moon arises from the varied inclination of the Zodiac in rising and setting, and this makes a difference in the moon's rising of an

hour, *i. e.* 1h. 17 minutes, or 17 minutes. In 1839 and 1857 there will be striking harvest moons.

According to Séjour, an eclipse of the sun can never be annular longer than 12′ 24″, nor total longer than 7′ 58″, and the duration of an eclipse of the sun can never exceed two hours.

Owing to the moon's libration in latitude, we sometimes see one pole, and then the other. And by the libration in longitude, more of the western limb is at times seen, and at others, of the eastern. The inclination of the axis to the earth's orbit is 60° 49′. The nearer the moon is to its *syzygies*, or conjunction and opposition, the greater its velocity; and the nearer to its quadratures, the slower. When the earth is in its perihelion, the moon's periodical time is the greatest; when in its aphelion, it is the least. The eccentricity of the monn's orbit varies in each revolution; being greatest when the moon is in syzygy, and least when it is in quadrature: and the orbit is most eccentric when the line of the *apsis* is in the syzygies, and least eccentric when this line is in the quadratures.

According to Lalande, the moon's horizontal semi-diameter is to its horizontal parallax, for the mean radius of the earth, as 15′ is to 54′ 57″.4, or nearly as 3 to 11: hence, the moon's semidiameter is $\frac{3}{11}$ of the earth's radius. And as the magnitudes of spherical bodies are as the cubes of their radii, the magnitude of the moon is to that of the earth as 3^3 to 11^3, that is, as 1 : 49, and distance about 240,000 miles.

By Herschel's observations, we learn that the altitude of the lunar mountains has been much exaggerated. The rock, situated near *Lacus Niger*, was found about one mile high; but none of the others, which he measured, proved more than half that altitude.

The enlargement of the light part of the moon, and the enlargement in the horizon, are optical allusions—one owing to bright objects enlarging pencils of light, and the other owing to the mind placing the moon at a greater distance, while the angle is the same.

To Herschel we owe an account of several burning voicanoes in the moon. In vol. 77, Phil. Trans. he says, I perceive three volcanoes in different places of the dark part of the new mnon. Two nearly extinct; or else in a state ready to break out; the third shows an actual eruption of fire, or of luminous matter. On the next night, Dr. H. saw the volcano burn with greater violence. He considered the eruption as resembling a small piece of burning charcoal, when covered by a thin coat of white ashes, which frequently adhere when it has been some time ignited; and it had a degree of brightness, about as strong as that of such a coal in faint day-light.

The moon's penumbra, in a central eclipse, will not cover the earth's whole disc. The semidiameter of the penumbra, being equal to the sum of the apparent semidiameters of the sun and moon, that is, about 16′ 23″ + 15′ 37″, or 32′ at the medium, its diameter is about 64′, whereas the diameter of the earth's disc is about 120′, hence, the penumbra cannot cover the whole. The height of the moon's shadow is about 60½ semidiameters of the earth. The semiangles of the earth's and of the moon's shadows, being each equal to the sun's apparent semidiameter, the angles are equal to each other, and these cones are similar. Therefore, as the semidiameter of the base of the earth's shadow (or of the earth) is to that of the base of the moon's shadow, (or of the moon,) so is the height of the earth's shadow to that of the moon's shadow. Now the semidiameter of the earth is to that of the moon, nearly as 100 to 28, and the height of the earth's shadow is about 217 semidiameters of the earth: hence the height of the moon's shadow is equal to about 60½ semidiameters of the earth; for 100 : 28 : : 217 : 60½ nearly.

The Tides are occasioned by the unequal reactions of the fixed land, and the mobile waters of the earth on the sun and moon. A solar tide arises, according to Galileo in 1616, from the direction of the rotations of the earth, from west to east during the day, and from east to west during the night; for in reversing these motions at sun-rise and sun-set, the waters are alternately retarded and accelerated; because they are mobile in relation to the fixed masses of land. Then Dr. Wallis, in 1666, ascribes the connexion of the moon to the same cause; the fulcrum of the earth and moon being on the near or remote side, as to the sun. Newton, in 1687, ascribed the whole to his attraction. But Galileo's and Wallis's theory are consonant with simple action and reaction. If the fulcrum describes the real earth's orbit, the waters as mobile will constantly be directed towards the line of the orbit, as the centre of the forces of the common system of earth and moon. At the full, when the earth is farthest from the orbit, the waters will rise the highest; and at the new moon, when the earth is also the farthest, the waters will also rise the highest. But at the quarters, when the earth is itself in the orbit, as well as the moon and fulcrum, then there are no tides,

but the remains of those of the last full and new moons. And as the angles of the line, which joins the centres of the earth and moon, increases or decreases, the tides increase or decrease. When the solar tide concurs with the lunar reaction, at the new and full, the tides are higher, and when the moon is in perigee or nearest, and her reaction greatest, the tides are still higher. There is a second tide in every 24 hours, because one tide increases the bulk of the earth on its side, or adds to the length of the earth's radius by its rise, and as the centre of the earth does not move, and the rotative power demands equality on both sides the centre, so the waters rise on the opposite side, to compensate for the rise on the other side.—*Editor*.

The highest tides are three days after the new and full; but if high-water happens at the very time of new and full, then the third tide is the *spring-tide*. The spring-tide in Perigee, is a 10th higher than other spring-tides. As it is a spring-tide every where on the same day, and the water is the same in quantity, so low-water, or the ebb, is lower, as the high, or flood, is higher. The difference, on two days, is about 24 hours, 48 minutes, or 50 minutes, as the moon is slow or swift in ecliptic motion. The spring-tides are greatest at the equinoxes, because the line of action from the earth's centre to the fulcrum of the earth and moon is direct, and at other seasons oblique. The tides in the English Channel flow about six miles an hour, or 35 or 40 miles, backward and forward.

The tide at Chepstow, owing to a funnel form, rises, at spring-tides, 56 feet, and at others from 40 to 50.

There is a tide in the Mediterranean of about a foot. The tides usually follow the moon's southing about three hours. They are least in the Arctic Seas, and greatest in narrow seas, under peculiar circumstances; as at St. Maloes, where they rise from 40 to 45 feet; and the Bay of Fundy, where they rise 80 or 90 feet.

The tide flows from the Nore to London Bridge, 40 miles, in two hours. The average rise at London Bridge is 17½ feet, at the Nore 14 feet, and at Deptford 18½. 650 million cubic feet of water pass London Bridge at every tide. The Bridges so much obstruct, that from Billingsgate to Teddington, the tide runs but eight miles an hour: but below, from the Nore to Gravesend 18, from Gravesend to Woolwich 20, from Woolwich to Deptford 22, and from Deptford to Billingsgate 16.

The time of high water being known at London, it may be known at the following places by *adding*,

For	h.	m.
Tinmouth Haven, Hartlepool, and Amsterdam	0	30
Brest	1	0
Scilly	1	45
Mount's Bay	1	55
Bridlington Pier & Humber	2	0
Fowey, Lon, and Plymouth	3	10
Dartmouth, Scarborough, & Hull	3	30
Torbay and Tinmouth	3	40
Exmouth, Topsham & Lyme	3	50
Bristol and Weymouth	4	20
Bridgewater and Texel	4	40
Portland and Harfleur	5	50

By *subtracting*,

For	h.	m.
Leigh, Maes, & Gouries Gat	0	5
Gravesend, Rochester, and Rammekins	1	20
Buoy of Nore and Flushing	1	30
Portsmouth, Ostend, Shoe-Beacon, and Red-Sand	2	0
Harwich, Dover, Spithead, and Calais	3	0
Gunfleet, Hastings, Shoreham, Orfordness, & Dieppe	4	0
Yarmouth Pier and Needle	4	40
St. Helen's and Havre-de-Grace	5	30

Of course, the tides show themselves most on the shores or sides of the basin of the seas, librating, or oscillating like water in a moved basin, and they are for the same reason very slight in the middle of extensive seas. They rise highest in rivers of funnel form, which contracts them as they ascend into it.

100 comets have entered the solar system with declinations from 80° to 90°, 88 from 70 to 80; 79 from 60 to 70; 63 from 50 to 60; 84 from 40 to 50, and only 90 below 40°. Only 24 have passed between Mercury and the sun, 47 within Venus, and 58 between Venus and the earth's orbit, and 73 between the Earth and Mars. The rest between Mars and Jupiter's orbits. Their orbits seem to be deflected or bent, when they arrive at the *plane* of the zodiac. Astronomers are now beginning to suspect, from their motions, that there is a resisting medium in space; a fact never doubtful.

Comets are chiefly remarkable for a luminous projection in a line directly opposite to the sun, which therefore follows them as they approach the sun, and goes before them as they leave the sun, and is a head or tail as their positions vary; but by the vulgar, this luminous projection is always called a tail. Comets have very large atmospheres, and Herschel thinks some of them are all atmosphere. Of course, then, the sun's rays pass through the spherical atmosphere, just like light through a glass globe, and the projec-

tion increases in length as it approaches the luminous sun. This simple cause and effect did not however accord with one of Newton's hypotheses—that which asserted a vacuum in space, and therefore various irrevelant theories have been imagined. When a comet has a distinct nucleus, the projection is divided in the middle by a sensible line, as that of 1811; these projections are some millions of miles loog, and some even 80 or 150 millions.

The comet of 1811 was 10,900 miles in diameter, *i. e.* twice the bulk of the earth, and its luminous projection was 132 millions of miles.—*Schroeter.*

But Lambert calculated that the comet of 1811 was 17 times larger than Jupiter, or 25,100 times larger than the earth.

The comet of 1680, the largest in modern times, had its orbit inclined 61° 22′ 55″, and passed within half a million of miles of the sun's surface, with a direct motion.

The return of the comet of 1759 is expected in October, 1835; the perihelion 304°, ascending node 55°, inclination 17°.46. Encke's comet or eccentric planet is said to have a period of 1,208 days, or 3½ years, and to have last appeared in January, 1829, but it has not appeared in 1832. Its inclination is 13°, and perihelion 157°, and its perihelion is within Mercury, and its aphelion beyond Jupiter. Biela's comet is said to have a period of 2,440 days, or 6⅔ years. It appeared in 1825, and ought to appear in November, 1832. Its perihelion is 109°, and inclination 13°. Another is imagined in 1848.

Whiston, on vague history and legends, sought to make it appear that the comet of 1680 had appeared in 1106, 531, and 43 B. C.; and he then calculated back to the times of the Deluge, and absurdly maintained that its cause was the near approach of this great comet.

Many comets have no nnclens, and the smallest stars have been seen through them. In those with a nucleus, the light nebulosity is not in contact with the nucleus. In the comet of 1811, the nebulosity was 25,000 miles, and its interior surface was 30,000 miles from the centre of the nucleus The tail is not to be distinguished from the nebulosity on its side. The nucleus of the comet of 1811 was 2700 miles in diameter. Some are not 40 miles, and others not 500. The tail of the comet of 1680 was 90 degrees, or 100 millions of miles long. That of 1769, 97 degrees, and 42 millions of miles. One, in 1744, had five or six tails, each seven millions of miles long. Hitherto, no phases have been discovered in them.

The comet of 1770, passed, in coming and returning, through the orbits of Jupiter's moons, but without producing any sensible effect.

Most comets present some differences of phenomena, which disturb previous theories respecting them.

The immense cluster of stars, called the Milky Way by the ancients, appear as a permanent luminous clond; and as our sun and system are in the midst of it, the cloud goes round the heavens. The larger visible stars, unless other remote nebulæ, are all part of this cluster. It is most luminous or thickest in the constellation of the Ship near the great Dog. In Ophiuchus it divides, but reunites. It is supposed to contain millions of stars, and perhaps each 30 or 40 millions of millions of miles asunder. In such an arrangement only 17 would be nearest and largest, and it is so, for there are so many of the first magnitude.

Hipparchus, in 128 B. C., made a catalogue of 1022 stars, all that can be seen with the naked eye. Flamstead, with telescopes, made another of 2884. Bode, in 1800, of 27,000; and Lalande, same year, of 50,000. Herschel compnted 50,000, in nearly six degrees of the Milky Way.

If, at the stars, the earth's orbit is 1″ the distance is 40 billions of miles. Observations prove that it is not 2″, and the distance is taken at 36 billions. Herschel considered the milky way to be a nebulæ or cluster of stars, in nearly the middle of which is our sun, all the separate visible stars being part of it. He counted 2500 similar nebulæ or clusters in the heavens.

Space seems to be occupied with clusters of stars, serving as separate suns to planets and systems. The clusters are of all forms. That of the milky way is like a tuning fork, and all the visible single stars belong to it, besides the invisible myriads.

Irregularities in planetary motions correct themselves, because every motion is included in the motion of the Sun, is itself subordinate, and therefore must ultimately conform. Thus the outer hemisphere of a planet might carry it into a tangent, but the solar force determines a limit, and the tangent force is so corrected that a mean orbit, though elliptical, is the result. It is a state of harmony produced by necessity.

There are regular Observatories at Abo, Altona, Bedford, Benares, Berlin, Bushey Heath, Calcutta, Cambridge, Cape of Good Hope, Dorpat, Dublin, Edinburgh, Geneva, Gotha, Gottingen, Greenwich, Kensington, Kew, Konigsberg, Lisbon Manheim Marseilles

Right Ascensions and Distances from the North Pole of 100 *Principal Fixed Stars, corrected to January* 1, 1830.

Names of Stars.	R. A.	Ann. Var.	N. P. D.	Ann. Var.
	H. M. S.	S.	° ′ ″	″
γ Pegasi	0. 4.29,6	+ 3,08	75 45.42	— 19,9
α Cassiopeiæ	0.30.54,6	3,33	34.23.47	19,8
β Ceti	0.35. 3,3	3,02	108.55.12	10,9
γ Cassiopeiæ	0.46 30,8	3,52	30.12 21	10,7
Polaris	0.50.32,0	15 51	1.35 51	19,4
δ Cassiopeiæ	1.14.45,8	3,82	30.39. 7	19,0
α Arietis	1.57.36,5	3,36	67.20.43	17,2
π Ceti	2.36. 2,1	2,84	104 34.58	15,7
α ,,	2 53.24,1	3,12	86.34.56	14,4
12 Eridani	3. 4.51,3	2,55	110.30 41	14,6
α Persei	3.12.13,7	4,22	40 45. 5	13,4
δ ,,	3.30 51,4	4,22	42.45.51	12,1
η Tauri	3 37.23,6	3,53	66.25.38	11,7
γ Eridani	3.50. 6,2	2,79	103.50.50	10,7
γ Tauri	4.10. 7,6	3,40	74.47.22	9,3
2 δ ,,	4.14.18,3	3,43	72.57.25	9,0
ε ,,	4.18.42,0	3,40	71 12.14	8,6
Aldebaran	4.26 10,5	3,43	73.50.23	7,7
Capella	5. 4. 8,6	4,41	44.11. 5	4,4
Rigel	5. 6.22,3	2,88	98.24.15	4,5
β Tauri	5.15.33,1	3,70	61.32.40	3,7
γ Orionis	5 16. 1,0	3,20	83.48 41	3,8
δ ,,	5.23.10,6	3,06	90.25.55	3,2
α Leporis	5 25.14,2	2,63	107 56.58	3,1
ε Orionis	5 27.35,4	3,03	01 10. 2	2,8
σ ,,	5.30.12,9	3,01	92 42.17	2,7
ζ ,,	5.32.11,1	3,01	92. 2.21	2,4
γ Leporis	5.37.22,8	2,49	112.30.33	1,6
κ Orionis	5.30.41,7	2,84	09.44.10	1,6
α "	5 45.58,3	3,25	82.37.55	1,1
β Aurigæ	5.47. 3,6	4,39	45. 4.47	— 1,2
γ Geminorum	6.27 53,4	3,46	73.27.48	+ 2,4
ε ,,	6.33.28,3	3,69	64.42.32	2,9
Sirius	6.37.30,3	2,64	106.20.20	4,7
δ Geminorum	7. 9 57,0	3 50	67 42.44	6,0
Castor	7.23.44,5	3 85	57.44.49	7,2
Procyon	7 30 24,1	3,15	84.20.44	8,9
Pollux	7.34.54,2	3,69	61.34.13	8,1
α Hydræ	9.19 14,1	2,05	97.55.31	15,3
ε Leonis	9.36.11,4	3,43	65.26.49	16,2
Regulus	9.50.18,7	3,21	77.12.17	17,3
ζ Leonis	10. 7.13,3	3,36	65.44.22	17,6
γ ,,	10.10.35,4	3,33	60.18. 5	17,9
β Urs. Majoris	10.51 31,7	3,71	32.42 30	19,1
α ,,	10.53. 0,9	3,80	27.19.58	10,3
δ Leonis	11. 5. 3 6	3,21	68.32.45	10,6
β ,,	11.40.23,0	3,07	74.28.39	20,1
β Virginis	11.41.50,7	3,12	87.16 38	20,3
γ Urs. Majoris	11.44.51,0	3,21	35 21.35	20,0
δ ,,	12. 6.58,4	3,00	32. 1.20	20,2
κ Draconis	12.26.10,6	2,62	10.16.24	20,0
δ Virginis	12.47. 2,6	3,02	85.40.36	19,7
Spica Virginis	13.16.14,0	3,15	100.16.14	18,9
ζ Urs. Majoris	13.17. 3,8	2,41	34.11. 4	19,0
η ,,	13.40.50,0	2,37	39.50. 7	18,1
α Draconis	13.59.47,5	1,61	24.48.34	17,3
Arcturus	14. 7.54,6	2,73	69.55.43	19,0
θ Bootis	14 10 24,5	2,04	37.21.38	16,9
π ,,	14.32.44,3	2,81	72.50.53	15,8
ε ,,	14.37.33,8	2,61	62.12.16	15,5

Names of Stars.	R. A.	Ann. Var.	N. P. D.	Ann. Var.
	H. M. S.	S.	° ′ ″	″
1 α Libræ	14.41.17,9	+3,30	105.17. 3	+15,4
2 α „	14.41.29,3	+3.30	105.19.46	15.4
β Urs Min. . . .	14.51.17,4	−0,31	15. 8 59	14,8
β Libræ	15. 7.52,3	+3,20	98.44.58	13,7
α Cor. Bor. . . .	15.27.29,0	2,54	62 42.28	12,5
α Serpentis . . .	15.35 54,1	2,95	83. 1 59	11,7
δ Scorpii	15.50.17,8	3,53	112. 7.40	10,7
β „	15.55.34,0	3,47	109.19.55	10,4
δ Ophiuchi . . .	16. 5.26,7	3,13	93.14.57	9.7
Antares	10.18.59,8	3,66	116. 2.44	8,7
ζ Herculis	16 34 52,8	2,26	58. 5. 4	0 8
α „	17. 6.51,0	2,73	75.24.33	4,6
β Draconis . . .	17.20.35,8	1,34	37.34 10	2,9
α Ophiuchi . . .	17.27. 2,9	2,78	77.18.33	3,2
γ Draconis . . .	17 52.39,8	+1,39	38.29.17	+ 0,7
δ Urs. Min. . . .	18.27. 8,5	−10,12	3.24.53	− 2,4
α Lyræ	18 31.11,1	+2,03	51.22.11	3,0
c Draconis . . .	18.30.20,9	1,16	34.37.40	3,4
β Lyræ	18.43.48,4	2,20	56.49.46	3,8
ζ Aquilæ	18 57.35,9	2,75	70.28 57	4,9
51 Draconis . . .	19. 1. 0,1	1,05	36 51 41	5,3
δ „	19.12.29,7	0,02	22 38.15	6,2
κ Cygni	10.13.10,3	1,38	36.56.32	6,4
δ Aquilæ	19.16.55,6	3,01	87.13. 1	6,6
ι Cygni	19.25 25,2	1,61	38 37.45	7.3
γ Aquilæ	19.38.10,7	2,85	79.47.41	8,3
α „	19.42 29,4	2,93	81.31.27	8,9
β „	19.46 57,8	2,95	84. 0.41	8,6
1 α Capricorni . . .	20. 8.13,2	3,34	103. 1 35	10,7
2 α „ . .	20. 8.37,0	3,34	103. 3 52	10,8
α Delphini	20.31 44,0	2,78	74.40 56	12,4
α Cygni	20.35.38,4	2,05	45.19.25	12,5
1st 61 Cygni . . .	20.59.17,4	2,73	52. 4 54	17,6
α Cephei	21.14.31,0	1,45	28. 7 58	15,0
β Aquarii	21.22.30 2	3,15	96.18.51	15,5
β Cephei	21.26 26,1	0,81	20.11. 4	15,6
δ Capricorni . . .	21 37 39,1	3,33	106 53.36	10,1
α Aquarii	21.57. 3,1	3,09	91. 8.30	17 0
α Pega	22 50 18,0	2,98	75.42 26	19,0
α Andromedæ . .	23 59.37,0	3,08	61.50.54	19,8

Milan, Montauban, Oxford, Palermo, Paramatta, Paris, Pekin, Portsmouth, Slough, Tubingen, Uraniberg, Verona, Vienna, Viviers, and Woolwich.

All Observatories are provided with a mural or fixed circle for the declination, and a meridian circle for transits, to record right ascensions. There are also, in them, azemuth and altitude circles, and often an equatorial.

The two best telescopic nebulæ are that in the sword handle of Orion, and that in the girdle of Andromeda.

The best known telescopes are Fraunhofer's at Dorpart, fourteen feet; and South's at Kensington, twenty feet.

The constellations, as far as the triangle, with *Coma Berenice's*, are *Northern*; those after *Pisces* are *Southern*,

Ptolomy's constellations were 48. Hevelius added 12, and Hallus 8.

Modern observation proves that nearly all the stars have local motions, and some near ones relative motions.

There are 28 stars which change their colours.

Algol varies its brightness from the second to fourth magnitude every 2d. 20h. 49′.

In 1756, that accurate observer, Bradley, published *the following*, as the exact places of 37 fixed stars, and in 1832, the Nautical Almanac gives the following, as the true apparent places of the same stars, in the mean of 1833, corrected for precession, aberration, and nutation, and it gives Polaris 1° 34′ 20″.5 from the Pole in 1833 :—

Names.	N.P.D. 1756.	N.P.D. Mean 1833.	Diff. between 1756 and 1833.
	° ′ ″	° ′ ″	″ ′
Polaris			
β Ursæ Min. . . .	14 50.49,0	15. 9 42,6	18.43,6 S.
β Cephei	20 30.22,9	20.10 16,9	20. 6, N.
α Ursæ Maj. . . .	26 56 16,7	27.20.56	24.39,3 S.
α Cephei	28 26 28,7	28. 7.12,7	19.16, N.
α Cassiop	34.48.17,4	34.22 47,1	25.30,3 N.
γ Ursæ Maj. . . .	34.56.56,4	35.22.35	25.38,6 S.
γ Draconis . . .	38 28.21,2	38.29.18,4	0.57,2 S.
η Ursæ Maj. . . .	39.27.40,2	39 51. 1,5	23 21,3 S.
α Persei	41. 4.47,8	40.44 24,9	20.22,9 N.
Capella	44 16.51,0	44.10.50,7	6. 0,3 N.
α Cygni	45 31.51,9	45.18.46,9	16. 5, N.
α Lyræ	51.25.46,6	51.22. 2,4	3 41,2 N.
Castor	57.36.10,2	57 45.10,6	9. 0,4 S.
Pollux	61.24.27,9	61.34 37,5	10. 9,6 S.
β Tauri	61.37.30,4	61 32.28,5	5. 1,9 N.
α Androm. . . .	62.15.26 8	61.49.53,5	25.33,3 N.
α Cor. Bor. . . .	62 26.59,7	62.43. 5,7	16. 6, S.
α Arietis	67.42.12,4	67.16.50.2	22.22,2 N.
Arcturus . . .	69.32.13,2	69.56.39,6	24.26,4 S.
Aldebaran	74. 0 14,9	73.49.58,7	10 16,2 N.
β Leonis	74. 3 55,1	74.29.39,3	25.44,2 S.
α Herculis . . .	75 18.45,6	75.24 40,5	6. 0,9 S.
α Pegasi	76. 6 10,2	75.44.41,8	24.42,3 N.
γ Pegasi	76 10.25,7	75.41.27,9	25.43,9 N.
Regulus	76.51. 4,7	77.13. 8,6	22. 3,9 S.
α Ophiuchi . . .	77.14.35,4	77.18 41.3	4. 5,9 S.
α Aquilæ	81.45.27,3	81.34. 0,7	11.26,6 N.
α Orionis	82 39 41,8	82.37.51,2	1.50,6 N.
α Serpentis . . .	82.47 24,2	83. 2 34,5	15.10,3 S.
Procyon . . .	84.10.19,8	84.21.10,3	10.50,5 S.
α Ceti	86.52.57,7	86.34.11,7	18 46, N.
α Aquarii	91.29.41,4	91. 7.38,8	22. 2,6 N.
α Hydræ	97.36 50,2	97.56.16,8	19.26,6 S.
Rigel	98.30.10,9	98.24. 1,4	6.48,8 N.
Spica Virg. . .	99.52,48,3	100.17.11	24 22,7 S.
α Capricor. . . .	103.16.53,0	103. 3.20,3	13.22,7 N.
Sirius	106.23 56,7	106.29.33,3	5.37,6 S.

If the latitude is deducted from 90°, the difference is the circle of stars at each opposite pole, which never rise or set in that latitude.

The distance of the remotest fixed stars, supposed to be the nebulous clusters, may be best conceived by Herschel's idea, that the light has been 48,000 years progressing to us, at its velocity of a million of miles in five seconds.

If an object is above 100,000 times more distant then the distance of two stations, the angle at one being 90°, that at the other is 89° 59′ 57″.9, or too small for observation. Such is the fact, as to the distance of the stars.

Herschel says, he saw stars 42,000 times more distant than Syrius; and a cluster 11 trillions of miles distant.

Temporary new stars of great brilliancy appeared in the time of Hipparchus, one in 1572, and another in 1604.

There are 34 northern constellations, 28 of which are ancient; and 45 southern, 14 of which were ancient. The British catalogue contains 17 stars of the first magnitude, 79 of the second, 223 of the third, and 510 of the fourth magnitude, being those commonly discerned by the naked eye. It gives 695 of the fifth magnitude, and 1604 of the sixth magnitude; in all 3128. The stars of the first magnitude are—

Aldebaran	.	. in Taurus.
Castor .	.	. in Gemini.
Regulus,	.	. in the Lion.
Spica .	.	. in Virgo.
Antares	.	. in Scorpio.
Dubhee	.	. in the Great Bear.
Capella	.	. in Auriga.
Arcturus	.	. in Bootes.
Vega .	.	. in Lyra.

Deneb . .	. in Cygnus.
Achernar .	. in Eridanus.
Betelgeuse .	. in Orion.
Canopus .	. in Argo.
Sirius . .	. in the Great Dog.
Procyon .	. in the Little Dog.
Cor Hydræ .	. in Hydra.
Fomelhaut .	. in the Southern Fish.

Kepler calculates that, in a spherical space, only 13 points can be equally distant; at twice the distance 52; and at thrice 117, which corresponds nearly with the number of stars of first, second, and third magnitudes.

Bradley thought, had the parallax of a fixed star been *one second*, he should have been able to detect it. The diameter of the earth's orbit is, therefore, but a point at the fixed stars.

The twelve signs of the zodiac, and the numbers of Stars recorded in them in the tables, are as under—

♈ Aries . . .	67
♉ Taurus . .	143
♊ Gemini . .	87
♋ Cancer . .	87
♌ Leo . . .	101
♍ Virgo . . .	117
♎ Libra . . .	53
♏ Scorpio . .	37
♐ Sagittarius . .	73
♑ Capricornus .	54
♒ Aquarius .	119
♓ Pisces . . .	115

In Feb. 1814, Herchel, the prince of astronomers, read to the Royal Society the results of thirty years' observations on Nebulæ, with the best telescopes ever possessed by man. He conceived that the stars form independent systems among themselves. He considers our sun as part of that shoal or system which we call the milky way, and that all the stars of the first, second, and third magnitude belong to that vast cluster. The stars, he remarks, are not spread in equal portions over the horizon, but are found in patches, each containing many thousands, and many more than the eye can separate in the mass. These he calls *clusters*.

In another paper he says, let us begin with the naked eye. The stars of the first magnitude, being, in all probability, the nearest, furnish a step to begin our scale; setting off, therefore, with the distance of Sirius or Arcturus, for instance as unity, we will at present suppose, that those of the second magnitude are at double, and those of the third at treble the distance; and so on. Taking it, then, for granted, that a star of the seventh magnitude is about seven times as far from us as one of the first, it follows, that an observer, enclosed in a globular cluster of stars, and not far from the centre, will never be able, with the naked eye, to see its end: for, since he can only extend his view about seven times the distance of Sirius, his eyes cannot be expected to reach the borders of a cluster, perhaps, not less than fifty stars in depth every where around him. The whole universe, therefore, to him, will be comprized in a set of constellations, richly ornamented with scattered stars of all sizes. Or, if the united brightness of a neighbouring cluster of stars should reach his sight in a remarkably clear night, it will appear as a small, faint, nebulous cloud, not to be perceived without attention. But allowing him the use of a common telescope, he begins to suspect that all the milkyness of the bright path which surrounds the sphere may be owing to stars, and by increasing its power of vision, he becomes certain that the milky way is a collection of very small stars, and the nebulæ other clusters of stars.

Dr. Herschel then solves a general problem, for computing the length of the *visual* ray; that of the telescope which he uses will reach stars 497 times the distance of Sirius. Now Sirius cannot be nearer than 100,000 × 190,000,000 miles, therefore Dr. Herschel's telescope will, at least, reach to 100,000 × 190,000,000 × 497 miles. And Dr. Herschel says, that in the most crowded part of the milky way, he has had fields of view containing no less than 588 stars; and these continued many minutes, so that, in a quarter of an hour, he has seen 116,000 stars pass through the field view of a telescope of only 15′ aperture: and at another time, in 41 minutes he saw 258,000 stars pass through the field of his telescope.

Pond states that his observations add to the probability that some variation, continued or periodical, takes place in the sidereal system; and, in consequence, it becomes impossible, by observations at distant intervals, to assign the place of a star, or predict its place for the future. The stars are mostly now found a considerable quantity to the southward of their predicted places, and the general tendency is so obvious as to leave no doubt of its reality."

In the previous tables we have the true places and total variations for 76 years, and it appears that of 37, only 18 south and 19 north. The whole is ocular

proof of *a solar orbit*, and of the progression of the earth and planets with the sun, among the stars, in space. Approached, they expand in distance, and north and south. Receded from, they collapse to the equator, and *vice versa*, south and north.

The present line of direction is exactly indicated by those which north and south the least. ♈ Draconis, which varies but 57//.25 in 76 years, has 17 : 52 : 39.8 R. A.; and *a* Orianis, which varies but 1/ 50// N. is in 15 : 45 : 53.3 R. A. so nearly 12 hours as to demonstrate that is nearly the line of motion. So Capella, which varies 6/ N. and *a* Herculis 6/ W. are respectively 5.4 8.6 and 17 6 54, and equally concur in proving that the Solar System is moving *from* the stars in the winter solstice *to* those in the summer, a coincidence with meaning. Lyræ and Ophiuchi are also as exactly opposed to Capella and Rigel in the heavens, and as accordant in variation.

The varied effects on stars in the same parts, as Castor and Pollux, or Aldebaran and Begelteaux, arises chiefly from their different distances, the nearest being most affected. Thus Pollux, 10.6 S. is nearer than Castor at 9.04 south.

Further observations on small stars near ♈, Draconis and Betelgeaux, will no doubt indicate the exact present direction of the tangent to the solar orbit, and its variations will enable us, in due time, to resolve its size, period, &c. and the true distance of the stars.

At the same time, we are to bear in mind, that the stars, as well as the sun, have proper motions of their own, and to reduce all these to simple quantities will be the work of many generations.

Navigation is an art founded on the perfection of astronomy. The *latitude* of a ship is determined from the heighth of the sun, taken by a quadrant at any hour of any known day, or from a meridian altitude, by a simple addition or subtraction. And the *longitude* is determined by measureing with a quadrant the exact distance of the moon from certain stars at a known moment. Then the same distance is exactly calculated in the *Nautical Ephemeris* for different hours at Greenwich, and the difference of time, deduced from known lunar motion, and reduced to degrees, is the exact longitude to seconds of a degree. The eclipses of the formula, and the use of "*the Requisite Tables*," for these important calculations, may be learnt in two hours, and exact time-pieces are used to verify, in case of cloudy weather. Jupiter's moons effect the same purpose.

CHEMISTRY.

Chemistry is the science of atoms; it detects their relative powers, their laws of combination, and their means of decomposition. It enables us, in conventional language, to understand the construction of bodies, and is, therefore, one of the most instructive and useful studies.

The science of chemistry assumed its modern character in the hands of Beccher and Stahl, residents of Mentz. They first perceived the connection of the atmosphere and of gases, with the production of phenomena, and paved the way for the discoveries of Bergman and Scheele, two Swedes, who died in 1784 and 1786, and were contemporary with Priestley in England, and Lavoisier in France; while Berzelius, another Swede, Fourcroy, Berthollet, and Gay Lussac, in France; Dalton, Thompson, and Davy, in England, have conferred arithmetical precision on its pursuits.

The first object is the Nomenclature:

Sulphur, by combining with oxygen, produces an *acid*. But this acid is in two states of saturation, having different properties. It is then requisite, for the same demarcation, to follow all the *saline* compounds of these two acids, and to attend to sulphur in its other direct combinations, with *earths, alkalies*, and *metals*. *Five* terminations, then, distinguish these *five* states of the same principle.

1. The *sulphuric* acid denotes sulphur in the utmost degree of saturation with oxygen; converted into gas, it will be sulphurous acid gas.

2. The *sulphurous* acid denotes sulphur united with a smaller proportion of oxygen.

3. *Sulphate* is the generic name of all the *salts* formed by the sulphur*ic* acid.

4. *Sulphite* is the name of the salts formed by the sulphur*ous* acid.

5. *Sulphuret* is the name of all the combinations of sulphur not acid.

Combined with oxygen, carbon is *carbonic acid*.

The same in gas, is *carbonic acid gas*.

Oxygenized, and forming salts with bases of earth, alkali, or metal, it is called *carbonate* of lime, or potash, or iron.

Combined without oxygen, it becomes, with iron, *carburet* of iron, &c.

Salts are distinguished by two names, one denoting *the acid*, the other *the base*. Thus, sulphate of soda is a combination of sulphuric acid and soda; sulphate of iron is compounded of sulphuric acid and iron; muriate of soda is a compound of muriatic acid and soda. Salts composed of acids ending in *ous*, have the termination *ite* instead of *ate*; thus

we have sulph*ites*, nitr*ites*, phosphor*ites*, &c. while sulphur*ic* acid and lime produce the sulph*ate* of lime: sulphur*ous* acid and lime, the sulph*ite* of lime.

Example of Nomenclature in Sulphur:

Sulphur*ic* acid, a strong acid.
Sulphur*ous* acid, a weak one.
Sulphur*et* of iron is sulphur and iron.
Prot-oxide of sulphur is the first deg.
Deut-oxide the second degree.
Trit-oxide the third degree.
Per-oxide many degrees.
Sulph*ate* is the salt of sulphur*ic* acid.
Sulph*ite* the salt of sulphur*ous* acid.
Bi-sulphate the salt of a double dose.
*Hypo*sulphurous acid,—less oxygen than sulphurous acid (1 to 2.)
*Hypo*sulphuric acid,—less than sulphuric (5 to 4.)

Other substances may easily be applied in like manner.

All compound bodies, and the smallest portions of them, are composed of the same constituents, united in fixed proportions. This discovery was made by Higgins, Bergman, Kirwan, and Weusell; and perfected by Richter, Berthollet, Wollaston, and Dalton. Gay Lussac shewed that one volume of any gas always combines with one, two, or three of another gas: thus, one volume of ammonia with one volume of muriatic acid, produces neutral muriate of ammonia; or with one volume of carbonic acid, produces carbonate of ammonia.

Componnded bodies, whose elements are gaseous, consist either of equal volumes of those elements, or if one exceed the other, the excess is by some regular multiple of the volume.

It is a very striking phenomenon of all bodies, that they, or their atoms, combine with all other bodies of their atoms, in certain proportions or their weights, and they form compounds only by means of those fixed proportions. The resulting quantities are affairs of mere proportions, the primitive numbers for each being known by experiment. This is called the law of definite proportions, and the numbers in the following table express the definite relations by weight of one to another in all their regular compounds. It is the same in gases; they also combine by weight; that is, by volume, the weight of volumes of the same gas being as the weight of the substance from which it was formed.

In rendering these relations numerical, some body is taken as a standard, that which combines in the smallest proportions, and this being hydrogen, it is made the integer or 1. The next in quantity of elementary bodies is carbon, 6; the next is oxygen, 8; and the next nitrogen, 14; and we may then exemplify this principle on these bodies, in proof of the harmony of nature, and the beauty of the discovery.

Whether two substances combine by weights or volumes, the proportions are the same; the numbers, therefore, for the gases are the same as their base.

Wollaston's scale greatly simplifies the use of this Atomic Theory. It gives not only the best determinations of numbers, but enables the operator to multiply the constituents at sight.

Some chemists consider the numbers as the weight of single atoms of the bodies, the proportions holding for any number; and taking oxygen as one, and hydrogen an eighth, the same proportions are given in the following mode of expression.

The weight of an atom of hydrogen is 0.132, but it is taken on this scale as one-eighth of an atom of oxygen at 1, or as 0.125; or oxygen being taken as 8, hydrogen is 1.

An atom of carbon is 0.751; of sulphur 2.0434; of ammonia is 2.128; of magnesia 2.503; of lime 3.62; of barytes 9.7; of oxalic acid 4.625; this last is a compound of 3 atoms of oxygen 3.2, of carbon 1.5, and 1 of hydrogen .125, of chlorine is 4.498.

An atom of platinum 12.161; of gold 24.838; of silver 13.714; of iron 7.143; of copper 8; of antimony 11.249; of lead 25.974; of tin 14.705; and so for other bodies.

An atom of manganese 6.833.

Taking hydrogen as 1, and oxygen as 8, the whole as follows; and from them, the numbers for acids and salts may be easily formed by additions.

Alumina	18
Antimony	44
Arsenic	38
Barium	70
Bismuth	72
Boron	8
Cadmium	56
Calcium	20
Carbon	6
Cerium	50
Chlorine	36
Chromium	32
Cobalt (30.5) or	26
Columbium	144
Copper (32) or	64
Gold	200
Hydrogen	1
Iodine (125) or	124
Iridium	30
Iron	28
Lead	104
Lithium	10
Manganese	28
Mercury	200
Molybdenum	48
Nickel	26

Nitrogen	14	Sodium	24
Oxygen	8	Strontium	44
Palladium	56	Sulphur	16
Phosphorus	127	Tellurium	32
Platinum	96	Tin	58
Potassium	40	Titanium	32
Rhodium	44	Tungsten	96
Selenium	40	Uranium	208
Silica	16	Water	9
Silicium	8	Yttrium	34
Silver	110	Zinc	34
Soda	32	Zirconium	40

Compound Equivalents of the Gases or their Bases, and principal Acids.

Peroxide of Hydrogen	H.	1 + O 16 =	17
Nitrous Oxide	N.	14 + O 8 =	22
Nitric Oxide	N.	14 + O 16 =	30
Hyponitrous Acid	N.	14 + O 24 =	38
Nitrous Acid	N.	14 + O 32 =	46
Nitric Acid	N.	14 + O 40 =	54
Carbonic Acid	C.	6 + O 16 =	22
Carbonic Oxide	C.	6 + O 8 =	14
Hyposulphurous Acid	S.	32 + O 8 =	40
Sulphurous Acid	S.	16 + O 16 =	32
Sulphuric Acid	S.	16 + O 24 =	40
Hyposulphuric Acid	S.	32 + O 40 =	72
Phosphoric Acid	Ph.	31.42 + O 40 =	71.42
Muriatic Acid Gas	Ch.	36 + H 1 =	37
Protoxide of Chlorine	Ch.	36 + O 8 =	44
Peroxide ditto	Ch.	36 + O 32 =	68
Chloric Acid	Ch.	36 + O 40 =	76
Perchloric Acid	Ch.	36 + O 56 =	92
Perchloride of Carbon	Ch.	108 + C 12 =	120
Hydriodic Acid	Iod.	124 + H 1 =	125
Ammoniacal Gas	H.	3 + N 14 =	17
Light Carburetted Hydrogen	H.	2 + C 6 =	8
Olefiant Gas	H.	2 + C 12 =	14
Sulphuretted Hydrogen	S.	16 + H 1 =	17
Phosphuretted Hydrogen	Ph.	94.26 + H 1 =	95.26
Prussic Acid	Cy.	26 + H 1 =	27

N. B. Brande makes oxygen 7.5, water 8.5, chlorine 33.5, nitrogen 13, sulphur 15, phosphorus 11, and carbon 5.7.

Eight parts by weight of oxygen, and one of hydrogen, form *water*.

Hence the equivalent numbers of the three are 8, 1, 9.

If oxygen be taken as 10, then hydrogen is 1.25, and water 11.25.

If oxygen be taken as 1, then hydrogen is 0.125, and water 1.125.

These are the *standards* for the equivalents of all bodies.

Water is also formed of *one volume* of oxygen to two volumes of hydrogen.

When water is decomposed by electricity, the hydrogen at the negative pole is double the volume of the oxygen at the positive pole.

100 parts of pure water contain 88.9 of oxygen to 11.1 of hydrogen, or 8 to 1.

A cubic inch of water, ther. 60 deg. weighs 252.52 grains, and contains 28.06 grains of hydrogen, and 224.46 grains of oxygen.

The volume of 28.06 hydrogen in gas is 1,325 cubic inches, and of 224.46 grains of oxygen is 662 cubic inches; consequently, the cubic inch is expanded in the gases 1.987 times.

100 measures of oxygen gas, at 1.111, and 200 of hydrogen, at 0.0694, form water.

Some chemists make oxygen 10, hydrogen 1.25, &c.; while Berzelius makes oxygen 100, hydrogen 12.5, &c. But 8 for oxygen is now generally adopted, and most easily remembered.

Water, by weight, consists of 1 oxygen, and 1 hydrogen; hence, as fundamental numbers, $8 + 1 = 9$; the equivalent of oxygen being 8 times more than hydrogen.

Whichever is taken of these scales, 48 parts of potassa, and relatively, 54 parts of nitric acid, produce 102 parts of nitre, whatever the weight of the parts; so 40 parts of sulphuric acid saturate 78 parts of baryta; and 40 of sulphuric acid, and 54 of nitric acid, neutralize 32 of soda, and 78 of baryta.

Again coal gas, or *Carburetted hydrogen*, is formed by 1 weight of carbon,

and 2 weights of hydrogen. Then the number for carbon is 6, and for hydrogen $1 + 2 = 3$, as the *relative* number, definite relation, or general *equivalent* for carburetted hydrogen, while all chemical componnds of carburetted hydrogen must be made with its weight of 8.

Olefiant gas is formed of carbon 2, *i. e.* $2 \times 6 = 12$, and hydrogen 2, *i. e.* $2 \times 1 = 2$; then $12 + 2 = 14$, as the equivalent of this gas among the numbers of other bodies.

Carbonic acid consists of 2 oxygen, and 1 carbon; and 2 oxygen being 16, and 1 carbon 6, the number for carbonic acid is $16 + 6 = 22$.

Ammonia consists of 1 nitrogen, and 3 hydrogen; *i. e.* $14 + 3 = 17$.

Dalton calls bodies of two equivalents, or atoms, *binary*, as water, 1 O + 1 H, and carbonic Oxide, 1 O + 1 C. Others of three, *ternary*, as deutoxide of hydrogen 2 O + 1 H, and carbonic acid 2 O + 1 C; others *quarternary*, &c. &c.

Four volumes of nitrogen, with one of oxygen, form atmospheric air in all situations, high and low, hot and cold.

A bulk of 1,000 of air, at 32 degrees, becomes 1,152 at 100 degrees, 1,376 at 212 degrees, and 2,797 at 1,000 degrees. It consists of 79 azote or nitrogen, and 21 of oxygen or vital air *in bulk*. And their specific gravities being 1.093 and .978, so 100 parts *in weight* is 77.44 of nitrogen, and 22.57 of oxygen.

100 measures of carbonic oxide, and 50 of oxygen, make 100 of carbonic acid.

Metallic oxides are formed by one, two, or three equal doses of oxygen.

The oxygen in the acid of a neutral salt is a multiple of the oxygen in the base by 2, 3, 4, &c.—*Berzelius*.

100 cubic inches of oxygen, combined with burning charcoal, is 100 of carbonic acid gas, weighing 46.313 grains, of which the carbon weighs 12.641, and the original oxygen 33 672.

100 cubic inches of carburetted hydrogen weigh 29.6 grains, of which the carbon is 25.4.

100 cubic inches of hydrogen weigh 2 117 grains; and the same combined with 33.773 sulphur, make 100 of sulphuretted hydrogen gas, weighing 35.89.

100 measures of azote and 300 of hydrogen, make 200 of ammoniacal gas.

And so for other gases, in the exact proportion of their equivalents.

33.5 or 67 of chlorine form *chlorides*.

50.5 or 101 of nitric acid form *nitrates*.

37.5 or 75 of sulphuric acid form *sulphates*.

20 7 of carbonic acid form *carbonates*.

25 of phosphoric acid form the *phosphates*.

15 or 30 of sulphur form the *sulphurets*.

Copper filings and sulphur unite in the proportions of 80 copper to 20 of sulphur, and also 64 of copper to 32 of sulphur. They burn with heat in an exhausted receiver.

Oxygenated water is a compound of 1 hydrogen, and 16 oxygen.

On mixing oxygen and nitrogen, no condensation takes place. The bulk is equal to the bulk of the two, and the specific gravity is the mean of both.

When 100 measures of carbonic oxide and 50 measures of oxygen gas are united, the compound is but 103 measures; and when 100 measures of azote are mixed with 300 measures of hydrogen, they form but 200 measures of ammoniacal gas.

A division of all substances into electro-negative and electro-positive, arises from the position they take when placed between the poles of a voltaic battery. Those which go to the *negative* pole are called *electro-positive*, and those to the *positive* pole *electro-negative*. Oxygen and chlorine are electro-negative, and hydrogen and nitrogen are electro-positive.

Sir H. Davy considered the non-metallic elements, as oxygen, whose *equivalent* is 8, chlorine 36, bromine 75, and iodine 124, as *electro-negative*; and hydrogen 1, nitrogen 14, sulphur 16, phosphorus 12, selenium 40, carbon 6, silicon 8, and boron 6, as *electro-positive*.

Their acid binary compounds are *electro-negative*, and the rest *neutral*, except ammonia (15) which alone is alkaline, basic, or *electro-positive*. Then the inunions with *salifiable bases* of the twenty-two acids are *salts*.

The natural metals afford nine acids, all from 2 arsenic, 2 molybdenum, 2 antimony, 1 colnmbian, 1 tungsten, and 1 chromium. 22 alkaline binary compounds, and 26 neutral. Their compounds being reduced at the negative or alkaline side of the voltaic battery, they are called *electro-negative*.

The oxides of mercury, silver, gold, platinum, rhodium, iridium, osmium, nickel, paladium, and their binary compounds are reduced by heat alone, and are called electro-positive.

Lead, cobalt, copper, bismuth, arsenic, antimony, and eight others, retain and absorb oxygen at high temperatures.

Tin, iron, zinc, cadmium, manganese, and their binary compounds retain oxygen, and decompose water, at high temperatures.

Potassium, sodium, and other alkaline metals, decompose water at the common temperature, and absorb oxygen at all temperatures.

Silex is acidulous and electro-negative in its affinities. By its insinuating powers it renders bodies acidulous or electro-negative in various degrees, down to potass, the highest electric positive or alkaline substance.

These terms, electro-positive and electro-negative, are equivalent to the acid and alkaline of the last generation of chemists, but they are now generally adopted.

Dry alkalies, touched by metals, are positive, and dry acids negative; and dry acids and alkalies similarly affect each other. Davy, therefore, ascribes *chemical affinity* to opposite electrical states.

Oxygen, the supporter of vitality and fire, was first discriminated as a distinct gas by Priestley, in 1774. Its existence was known to Scheele as empyrial air; but, as the apparent antagonist of combustible gas, or Stahl's phlogiston, he called it dephlogisticated air.

Oxygen gas is procured by heating red the per-oxide of manganese, which is 28 M + 16 O. One ounce yields 128 cubic inches, and the per-oxide becomes a prot-oxide, or 28 M + 8 O. It is also obtained from chlorate of potash, 124 grains of which yield 48 grains, or 141 cub. in. of oxygen. Also from nitre.

Hydrogen gas is made by putting iron or zinc into sulphuric acid, diluted with four parts of water. The smell arises from some carburetted hydrogen.

An oxide possesses no acid properties, and oxygen gas has neither acid nor alkaline properties; and hydrogen has neither colour, nor taste, nor odour. Neither oxygen, nor hydrogen gas, change the vegetable colours.

Hydrogen is exploded by a burning body, when two parts are mixed with ten or twelve of air, or with one of oxygen.

Hydrogen and oxygen do not combine at ordinary temperatures, but hydrogen burns, and combines with oxygen, when set on fire. A jet of it on spongy platinum takes fire. One lb. in burning, melts 320 lbs. of ice.

Hydrogen, the phlogiston of Scheele and Priestley, is that gas which, when excited, immediately combines with oxygen and produces flame, by which the oxygen disappears, and a new concentrated substance is produced. From this connexion with flame, Cavendish called it inflammable air, but it is now called hydrogen, because in bulk it is the chief constituent of water. It is contained in all bodies which burn with flame. Phosphuretted hydrogen is generated by the decomposition of animal bodies, and hence has produced phenomena in church-yards favorable to superstition.

Sulphuretted hydrogen is poisonous, and the 250th part of it in the atmosphere has killed a horse. It tarnishes metals; it gives the flavour of rotten eggs to water, like that of Harrowgate.

Hydrogen gas has no taste, but a slight though disagreeable smell. It may be taken into the lungs, but cannot be respired for more than a minute. Small animals die in it much sooner. Sounds in it, or with it, become acute.

Hydrogen gas may also be obtained in marshes or stagnant waters, in hot weather. If a bottle be filled with water, and a funnel put in, and both held downward in a ditch, and the mud stirred at the bottom, the gas will rise into the bottle, and displace the water; but cork the bottle before taking it out of the water. As the gas is forced out, hold it to a lighted candle, and it will burn with a fine blue flame.

One part of hydrogen, mixed with two or three parts of air, explode violently by the action of an inflamed body, or an electrical spark.

Priestley discovered nitrogen to be the other component of the atmosphere. It is also called Azote. It is the gas that remains after atmospheric air has been deprived of its oxygen; and it is found to be nearly four-fifths of the volume, or as 79 to 21. Their separation may be effected, by putting sulphur and iron filings into a close vessel, when they absorb the oxygen, and leave the nitrogen.

Nitrogen may be obtained by burning phosphorus under a close vessel, the oxygen being fixed by the combustion, and the residue nitrogen. It is colourless, and devoid of taste or smell, and has no effect on vegetable colours. Berzelius and Davy consider it a compound.

Charcoal is a hard substance, unchangeable by heat, or acids, or alkalies, and a non-electric. It absorbs from an eighth to a fifth of its weight of gases, and gives them out again when heated; and it abstracts the odour and colour from must substances. When duly heated, it is converted into carbonic acid gas; and its pure kinds are *carbon*, the purest being the diamond, which burnt, becomes entirely carbonic acid.

100 cubic inches of carbonic acid gas, or oxide of carbon, weigh 46.597 gr., consisting of 33.888 oxygen, and 12.709 of carbon, equal to 22 grains, and have

1.277 specific gravity. It extinguishes flame, and suffocates animals. Water constantly absorbs it in the ratio of pressure, and parts with it when the pressure is removed, called effervescence in bottled liquors. It renders lime-water turbid, and combines with alkalies, as carbonates.

Carbonic acid gas is a product of fermentation, and, being heavier than air, it lies over all fermentive processes, puts out a candle, and produces suffocation. At the bottom of wells and coal-mines, it causes the choke-damp, in which a light will not burn, but which may be dispersed by throwing water into it. It is carburetted hydrogen which takes fire in coal-mines, and which, under the name of fire-damp, destroys so many miners.

Vast volumes of carbonic acid gas escape from pits and lakes. It abounds in marble and chalk; and may be separated by heat, or by any of the acids. In burning lime, the carbonic acid flies off in gas, leaving the calcareous earth pure. If we put pounded marble, or lime-stone, into a retort with sulphuric acid diluted with water, carbonic acid will be disengaged, and pure lime will combine with the acid, and form sulphate of lime, or gypsum; and if we pour it into a wider-mouthed vessel, though invisible, it will pour out like water. It is formed abundantly during fermentation; it occupies the empty space of the vessels containing the fermenting liquor, and flows over the top. It produces a structure of the glottis, and hence suffocation.

Carbonic acid gas was the first elastic fluid certainly distinguished from air, and its acid nature was discovered by Black in 1755.

Carbonic acid gas poured into a vessel containing a lighted taper, extinguishes the flame. It reddens litmus paper, and combines with alkalies, alkaline earths, and metallic oxides.

A compound of carbon and hydrogen, called *carburetted hydrogen*, is disengaged in certain natural operations, particularly in the decomposition of vegetables; and it is the gas evolved in stagnant waters. It may be procured by distilling coal. It is the gas which is evolved at the wick of a lamp or candle, when excited, and by fixing oxygen, it creates a local heat, which protrudes the surrounding atoms as light.

Silica is the basis of the mineral world, and carbon of the organized. Pure silex or silicon is a dark brown solid without lustre, and infusible.

Sulphur is found in conjunction with silver, copper, antimony, lead, and iron. It is a negative electric, specific gravity 1.90. It melts at 240, and may be cast to 280; but it thickens by evaporation at 320°, and at 428° becomes a soft paste. At 550° it boils, evaporates, and produces flowers of sulphur. It has four combinations with oxygen; two and one in hypo-sulphurous acid; one and two in sulphurous acid; one and three in sulphuric acid; and two and five in hypo-sulphuric.

Sulphur is made from pyrites, and has 7 per cent. of orpiment earth; but volcanic sulphur brought from Italy is but three per cent. 15,000 tons per annum are imported, to make gunpowder and sulphuric acid.

Phosphorus is the base of an acid found in urine and bones, and the oxygen is detached by charcoal at a red heat. Re-burnt it forms flakes, and these absorbing vapour become liquid phosphorous acid. It also abstracts oxygen from nitric acid, and is very powerful, being two phosphorus, and five oxygen = 71.42 per Berzelius.

Chlorine or green gas, called also oxymuriatic acid, is considered as a simple substance, specific gravity 2.5; though it yields oxygen by supporting combustion, and combines with hydrogen greedily. It is produced from the action of muriatic acid (36 Ch. + 4 Hyd.) on peroxide of manganese (28 M + 16 O) The results are water, 8 O + 1 H, and 36 Ch.; with 28 M + 8 O.—*Davy.*

Chlorine is the basis of that universal substance salt, which consists of Ch. 36 + Sodium 24; for when sulphuric acid is added, its water is decomposed, the hydrogen unites with the Ch. 36, and forms muriatic acid gas 37; and the sodium becomes sulphate of soda, by the oxygen in the water.—*Davy.*

The specific gravity of muriatic acid gas is 1.2847; and it consists of equal volumes of chlorine and hydrogen. It absorbs water so instantly as at once to melt ice, and water absorbs 480 times of its bulk of the gas, becoming 1.2109.

Chlorine removes all colours, when moistened with water, which is decomposed by its hydrogen forming muriatic acid gas; and it absorbs all the hydrogen, which is the vehicle of odours.

Chlorine combines with all metals, and with some with such intense force as to produce flame, as in powdered zinc, arsenic, and antimony.

Iodine, or violet gas, resembles chlorine gas, and has some of its characters, besides being a product of seaweeds. Its specific gravity 8 7, and 100 cubic inches weigh 262 grains. Bromine is another product of sea-water, which seems to have its peculiar elements.

Starch and iodine are delicate tests for each other.

Iodine, in strong ammonia, form a highly-detonating powder, being iodide of nitrogen.

Naphtha, &c. are carburets of hydrogen in equal proportions.

Olifiant gas is six parts of alcohol, and 16 of strong sulphuric acid, gassified by heat. Its specific gravity 0.9722; and it is carbon $2 \times 6 = 12$, hydrogen $2 \times 1 = 2$, *i. e.* 14.

A volume of hydrogen and chlorine forms two volumes of muriatic acid.

The deutoxide of lead and the peroxide of iron combine in $\frac{3}{2}$ proportions of oxygen, and not evenly, as in other cases.

Carbonic oxide gas is $1\ C + 1\ O = 14$, and is inflammable, but arrests animal life; hence the carbon in it, as well as diamond, and all carbon must contain hydrogen; and in proof, burnt carbonic oxide is carbonic acid with another dose of oxygen.

The vapour of water is equal to the volume of hydrogen contained in it.

An ounce of zinc, with water and acid, yields 676 cubic inches of hydrogen gas, and of iron 782.

Perkins compressed water 1-12th with 2000 atmospheres.

The air which rises from pure water, under an air-pump, contains 34.8 per cent. of oxygen, and, by boiling, 32 per cent. Fish breathe this air.

THENARD enumerates 28 gases at the freezing point of water. Chlorine and its compounds are green, and nitrous vapour red. Hydrochloric, fluoboric, fluosilicic, and hydriolic, produce white vapours.

Inflammable gases are hydrogen, and its sulphurets, arsenurets, tellurets, selenurets, and potassurets; also hydrurets of phosphorus and of carbon, carbonic oxide, and cyanogen.

Supporters of flame are oxygen, oxide of azote, and of chlorine. Acid gases, which redden litmus, are sulphurous, fluoboric, fluosilicic, hydriodic, hydrochloric, carbonic, and chloro-carbonic.

Sulphurets and tellurets of hydrogen, and cyanogen, oxide of chlorine, destroy the red which they first produce.

Oxygen, azote, hydrogen, hydruret of carbon, carbonic acid, and oxide of azote, have little odour compared with others.

Those soluble in one-thirtieth of water are flooboric, fluosilicic, hydrochloric, hydriodic, sulphurous acid, and ammonia.

The acid gases, sulphurets, and tellurets of hydrogen, chlorine, cyanogan, and ammonia, are soluble in alkaline mixtures, and alkaline gas in ammonia.

The specific gravity and weight of the principal gases are—

		Weight per cubic inch.
Atmospheric air	1.0000	0.305
Oxygen	1.1111	0.33888
Hydrogen	0.0745	0.02118
Nitrogen	0.9722	0.29652
Sulphurous acid gas	2.222	0.67776
Chlorine gas	2.496	0.7625
Muriatic acid gas	1.2847	0.39184
Carburetted hydrogen	0.5554	0.16939
Carbonic acid	1.5277	0.46597

Oxygen is 16 times heavier than hydrogen.

The five heaviest gases are—

Chloric gas	2.496
Nitric acid gas	2.427
Sulphurous acid gas	2.222
Vapour of ether	2.25
Vapour of alcohol	2.1

The four lightest gases are—

Carburetted hydrogen	0.555
Arsenical hydrogen	0.529
Phosphuretted hydrogen	0.352
Hydrogen	0.745

One carburetted hydrogen explodes with five oxygen.

Atmospheric air is to water as 1 to 828.

Gas, standing over water at 42° Fah. imbibes 0.01 aqueous vapour, at 53° it is 0.015, at 60° it is 0.0186, at 70° it is 0.0256, and 80° it is 0.0353.

100 cubic inches of air are equal to 30.5 grains, of oxygen 33.8, hydrogen 2.1, nitrogen 29.7, chlorine 76.3.

Iodine, whose vapour is violet-blue, with mercury is red, and with lead yellow. Brown oxide of copper produces green and blue salts. Yellow oxide of lead has colourless salts.

Dr. Farady, by decomposing hydrate of chlorine, produced chlorine itself, in a liquid state, very volatile, with a specific gravity of 1.33.

Sir H. Davy, from muriate of ammonia and sulphuric acid, produced muriatic acid gas as liquid; its explosive pressure at 50° was equal to 40 atmospheres.

Dr. Farady also produced liquid sulphurous acid from the *gas*. It did not freeze at Zero, but rapidly evaporated, as the gas, and at 45° expanded as two atmospheres. Its specific gravity is 1.42.

He also produced liquid of sulphuretted hydrogen gas from muriatic acid and sulphuret of iron; compared with which ether was tenacious and oily. It instantly dispersed with a force of 17 atmospheres at 50°, and its specific gravity was 0.9.

And liquid carbonic acid from carbonate of ammonia and concentrated sulphuric acid. It volatizes from the freezing-point to Zero, with a force of 36 atmospheres, and is dangerous.

Euchlorine was also liquified; but the tube burst before it could be examined.

Nitrous oxide was also distilled in a tube, by heat at one end and cold at the other, from nitrate of ammonia; but it instantly exploded, with a force of 50 atmospheres.

Carbonic acid gas requires the pressure of 60 atmospheres to reduce it to a liquid, and the pressure of the liquid is equal to this power, as long as any of the liquid continues.

Cyanogen, from cyanuret of mercury, had a specific gravity of 0.9, and evaporated, with great cold, at 45°, with a force of 3.7 atmospheres. Ammonia gave a liquid, specific gravity 0.76, with 6.5 atmospheres, at 50°.

Attempts to produce hydrogen, oxygen, &c. by generating them under the pressure of strong glass tubes, and condensing with cold, did not succeed. Sir H. Davy produced liquefaction by placing the gas in one leg of a bent tube in mercury, and heated ether in the other leg, the pressure of the gas of which liquified the other gas.

When definite quantities of oxygen unite to metals or inflammable bodies, they produce ACIDS: thus sulphurous, phosphoric, and boracic acids are formed by an union of definite quantities of oxygen with sulphur, phosphorus, and boron; and muriatic acid gas is formed by the union of chlorine and hydrogen. When smaller proportions of oxygen unite with inflammable bodies or metals, they form substances not acid, or oxides more or less soluble in water; and the metallic oxides, the fixed alkalies, the earths, and all bodies connected by analogies, are produced by the union of metals with oxygen.

ACIDS are of four kinds, viz. *the mineral acids*, as the sulphuric acid; the *metallic acids*, as the arsenious; the *vegetable acids*, as the acetous, or malic; and the *animal acids*, as the phosphoric and lactic acids.

Sixteen are from the *mineral* kingdom: 1. The sulphuric acid. 2. The sulphurous. 3. The nitric. 4. The muriatic. 5. The oxygenated muriatic. 6. The hyper-oxygenated muriatic or chlorine. 7. The carbonic. 8. The phosphoric. 9. The phosphorous. 10. The boracic. 11. The fluoric. 12. The arsenic. 13. The arsenious. 14. The molybdic. 15. The molybdenous. 16. The chronic.

The *vegetable* kingdom furnishes 12. 1. The acetous. 2. The acetic. 3. The oxalic. 4. The malic. 5. The citric. 6. The tartarous. 7. The mucous. 8. The gallic. 9. The benzoic. 10. The succinic. 11. The camphoric. 12. The suberic.

The *animal* kingdom supplies 5. 1. The prussic. 2. The lithic. 3. The sebacic. 4. Margaric. 5. Stearic.

Besides these, there are, 1. The melitic. 2. The moroxylic. 3. The amniotic. 4. The bombic. 5. The laccic. 6. The rosacic. 7. The fulminic.

Acids of the *first class* contain only *two* principles, viz. oxygen, and some substance called the base; as the sulphur*ous* and sulphur*ic* acids are formed of the base sulphur. Those of the *second class* are composed chiefly of oxygen, hydrogen, and carbon, in different fixed proportions.

Many of the acids are found in great abundance in nature, but combined with other substances. Thus, the vast masses of limestone, chalk, and marble, found in every part of the world, are combinations of lime and carbonic acid; gypsum, of which there is so much, in different parts of the globe, is composed of lime and sulphuric acid.

Acids change blue, purple, and green colours of vegetables into red; and neutralize alkalies and earth. Their elementary principle is oxygen.

Acids and alkalies are, to each other, like negative and positive, and when mixed in equal proportions, neutralize each other, and, when neutralized, are in equal proportions saturated.

The principal *alkalies* are Ammonia, and its carbonate, muriate, sulphate, and acetate. Potass, and its carbonate, sub-carbonate, sulphate, bi-sulphate, nitrate, oxalate, tartrate, prussiate, and chromate. Soda its carbonate, sub and bi; sulphate, nitrate, muriate, and borate.

Alkalies have the power of changing the blue vegetable juices to green, the green to yellow, the yellow to orange, orange to red, and red to purple. Chlorine destroys vegetable colours.

100 of pure potash are equal to 70 of concentrated sulphuric acid, and thus they are mutual tests.

Potash, or fixed vegetable alkali, is procured from the ashes of vegetables exposed to the air; it runs into liquid, and is very acrid and corrosive. Its specific gravity is 1.7.

Soda is a mineral alkali, but may be procured, like potash, from ashes. Its specific gravity is 1.34.

SALTS are compounds of acids with alkalies, earths, and metallic oxides. Thus there are muriates from muriatic acid, fluates from fluoric acid, borates from boracic acid, and phosphates from phosphoric acid, sulphates from sulphuric acid, carbonates from carbonic acid, nitrates from nitric acid, oxymuriates from oxymuriatic acid, arseniates from arsenic acid, oxalates from oxalic acid, tartrates from tartaric acid, prussiates from prussic acid, &c. &c. besides phosphites, sulphites, and nitrites, from lower degrees of acidity.

All *salts* consist of an acid and metallic oxide. Commonly, however, the protoxide is the salifiable base. Those oxides soluble in water give a brown stain to yellow turmeric paper, and restore the blue of reddened litmus.

Aquafortis, or *nitric acid*, is, by volume, 100 nitrogen to 250 oxygen; and, by weight, equivalent 14 of nitrogen to 5 of oxygen, $5 \times 8 = 40$. So that $14 + 40 = 54$ is the equivalent or relative weight of an atom of aquafortis. It is colourless, and has a specific gravity of 1.51. If 58 of it and 42 of water are mixed, the volume is but 92.65, and the temperature rises from 60° to 140°. It rapidly liquifies snow, and generates great cold. It boils at $+248$, and freezes -50.

A stroke of lightning often produces nitric acid.

The facility with which nitric acid yields its oxygen, enables it to oxidate metals, especially tin, copper, and mercury, and it rapidly decomposes vegetable and animal substances. It parts with three of its doses, and becomes deutoxide of nitrogen, and even light carries off one dose. As it loses its oxygen, it changes colour, from light yellow down to blue.

Vitriol, or *sulphuric acid*, is 1 of sulphur $16 + 3$ of oxygen $24 = 40$. The volumes are 100 S. and 150 O. Its specific gravity is 1.847, and it boils at 620° and freezes $-15°$. Its oily character gave it the name of oil of vitriol.

Aqua regia is one measure of nitric acid and two of muriatic acid, and dissolves gold and platinum.

Analysis of various popular substances.

Alcohol consists of—

Oxygen	37.85
Carbon	43.65
Hydrogen	14.94
Azote	3.52
Ashes	0.04

Sulphuric ether consists of—

Carbon	58.2
Hydrogen	22 14
Oxygen	19.66

Nitric ether consists of—

Oxygen	48.52
Carbon	28.45
Azote	14.49
Hydrogen	8.54

Muriatic ether consists of—

Muriatic acid	29.44
Carbon	36.61
Oxygen	23 31
Hydrogen	10.64

Acetic acid, or distilled vinegar, is composed of—

Oxygen	44.147
Hydrogen	5.629
Carbon	50.224

Oxalic acid is composed of—

Oxygen	70.689
Hydrogen	2.745
Carbon	26.556

Tartaric acid consists of—

Oxygen	69.321
Hydrogen	6.629
Carbon	24.05

Citric acid, prepared from the juice of lemons, consists of—

Oxygen	59.859
Hydrogen	6.33
Carbon	33.811

Sugar—

$37\frac{1}{2}$ to $43\frac{1}{2}$ of carbon.
$6\frac{1}{2}$ to 7 of hydrogen.
$50\frac{1}{2}$ to $55\frac{3}{4}$ of oxygen.

Fermented sugar and water—

57 parts alcohol.
43 carbonic acid.

Sugar, per Berzelius—

7 hydrogen.
44 carbon.
49 oxygen.

Olive or table-oil contains—

Carbon	77.213
Oxygen	9.427
Hydrogen	13.36

Wax consists of—

Carbon	81.784
Hydrogen	12.672
Oxygen	5.544

Rosin consists of—

Carbon	76
Oxygen	13
Hydrogen	11

Copal consists of—

Carbon	77
Oxygen	11
Hydrogen	12

Oak wood contains—

Oxygen	42
Carbon	52
Hydrogen	6

Beech contains—

Oxygen	43
Carbon	51
Hydrogen	6

Wheat and barley contain as under:

	wheat	*barley*
Silica	13.2	66.7
Carbonate of lime	12.6	24.8
Carbonate of magnesia	13.4	25 8
Alumina	.6	4.2
Oxide of maganese	5.	6.7
Oxide of iron	2.5	3.8

The quantity of each being 2 lbs.

One-twelfth of wheat is gluten, which consists of oxygen, hydrogen, azote, and carbon. The gluten varies—

Autumnal wheat contains,

77 Starch
19 Gluten

Spring wheat

70 Starch
24 Gluten

Oats contain

144.2 Silica

Rye straw

152 Silica

Distinct compounds formed in vegetables are called proximate principles, and their decomposition is called ultimate analysis.

Starch contains
38½ to 45 of Carbon
6 to 7 of Hydrogen
48½ to 55 of Oxygen

168 potato starch consists of
49.455 Oxygen
43.481 Carbon
7.061 Hydrogen

This would make sugar at 3*d.* per pound.—*Day.*

Rochelle salts consist of
55 Tartrate of potash
45 Tartrate of soda

Sea-water contains
1.35 of muriate of soda
.004 of muriate of magnesia
.0025 of Epsom salts
.00125 of gypsum

It obstructs all light at 120 fathoms.

During the combustion of 16 oz. of alcohol, water of greater weight is produced, and also carbonic acid.—Alcohol from 30° to 100° expands a 25th, but water only the 145th. At 60°, standard alcohol is 825.

Gilpin, secretary of the Royal Society, Dollfius, and Blagdon, in 1789, performed a most elaborate series of 260 experiments, 3 times over, on the specific gravity of alcohol from 30° to 100°, with mixtures of 15 water from 5 to 100, in 100 quarts of spirit, and then 100 of water to 95, down to 5 of spirit. At 30° the spirit was 83,896; at 40°, 83,445; at 50°, 82,977; at 60°, 825; at 75°, 8178; at 90°, 81,044; and at 100° 80,548, being a difference of 3,348 in 70° of heat.

At 60°, 25 of water raised the specific gravity to 86,918; 50 of water to 89,707; 75 to 91,622; and 100, or equal spirit and water, to 93,002, the true mean being 9125. At 30°, equal quantities gave 94,222, and at 100°, they gave 9131,—50 of spirit to 100 of water, at 60°, gave 95,804; and 5 of spirit to 100 of water, at 80°, gave 98,991.

1,000 grains of brandy, evaporated to dryness, gave 40 of residuum of foreign substance, but in rum but 8½.

Burnt with care, the product of the alcohol was water, and an 8th more, and in closed vessels, in oxygen, the product was water and carbonic acid, proving that alcohol is carbon and hydrogen.

Professor Brande's analyses of the quantity per cent. of alcohol, or pure spirit, in the following liquors, give:—

Scotch whiskey	54.32
Irish	53.9
Rum	53.68
Brandy	53.39
Gin	51.6
Port	22.9
Madeira	22.27
Currant	20.55
Teneriffe	19.79
Sherry	19.17
Claret	15.1
Champagne	13.8
Gooseberry	11.84
Elder	8.79
Ale	6.87
Porter	4.2
Cyder	9.8 to 5.2

100 parts of cream, specific gravity 1.0244, contain 4.5 of *butter*, caseous matter, 3.5., whey 92.

1,000 parts of *milk*, specific gravity 1.033, contain water 928.75, caseous matter 28, sugar of milk 35. The remaining 8.25 acid, alkalies, and iron.

The curd of cheese consists of 60 carbon, 11 oxygen, 7 hydrogen, and 22 nitrogen.

In an *egg* of 1,000 grains, the shell is 106.9, the white 604.2, and the yolk 288.9. The shell is 97 carbonate of lime, and only 2.2 of animal matter.

Gunpowder, as made by the English government,
75 of nitre
10 of sulphur
15 of charcoal.

In France, the proportions are—
77 of nitre
9 of sulphur
14 of charcoal.

The gazeous products of 100 grains are 91 cubic inches, and the solid products 54 grains. The gases are
Azote 42 inches
Carbonic acid 30 inches
Carburetted hydrogen 9
Sulphuretted hydrogen 4
Nitrous gas 6
making 91.

The solid contents are
40 grains of sub-carbonate of potash
11 of sulphate of potash
3 of charcoal
½ of sulphur

The *charcoal* used in gunpowder is distilled in iron vessels, from willow, alder, and some other woods.

100 parts of oak make 22 of charcoal
Of beech 20
Of deal 19, glossy black
Of elm 19½, black
Of ash 18, glossy black
Birch 17, rich black

100 parts of shavings of dry wood produce one-fourth of *charcoal* by slow combustion.

Glass is formed by combining, in a state of fusion, fixed alkalies with silica, and the occasional addition of litharge, oxide of iron, or manganese. That called flint glass is made of fixed alkalies, calcined flints, and litharge or oxide of lead. Ground glass is

made of fixed alkali and siliceous sand, with oxide of iron for a green tinge, or oxide of manganese for a purple tinge. Bottle glass consists of lime fused with silica and alumina, with iron and manganese.

Flint *glass* is generally made of 100 sand, 6 red-lead, and 3 pearl-ash, with some manganese to correct the green colour.

Plate *glass* is made of 43 sand, 26.5 sub-carbonate of soda, 4 quick lime, 1.9 nitre, and 25 broken glass, which makes 75 of glass.

Crown *glass* is made of 50 sand and 110 kelp.

Bottle *glass* is made of soap-boiler's waste and river sand; or of sand, lime, clay, and sea-salt.

Oxide of cobalt tinges *glass* green; oxide of iron or copper, green; of manganese, violet; of iron and copper, red; of gold, purple; of silver, yellow; and of arsenic and zinc, white.

The real quantity of alkali contained in the substances used in bleaching, of 100 parts is

American pearl-ashes	60 to 73
Russian pearl-ashes	52 to 58
White Dantzic do.	45 to 52
Alicant barilla	20 to 33
Natron	20 to 30
Salt of tartar	72
Common salt	53

Animal substances, besides the principles of vegetables, contain much nitrogen with little sulphur, and phosphorus, and their compounds with carbon.

Albumen is an animal substance, of which the white of an egg is an example. It becomes a white coagulate at 165 deg., or if corrosive sublimate is united to it. It contains

53 Carbon
24 Oxygen
7 Hydrogen
16 Nitrogen

Mucilage

36 to 45 of Carbon
5½ to 7 of Hydrogen
48 to 55 of Oxygen

The substance of brain consists of the following constituents:—

Water	80.
White fatty matter	4.53
Red ditto	0.7
Albumen	7.
Osmazome	1.12
Phosphorus	1.5
Salts and Sulphur	5.15

Oil and *fat* are compounds of carbon, hydrogen, and oxygen. Fat consists of two substances, one which melts at 50 deg. and the other at 105 deg.; the former oil, and the latter suet. Butter made in summer contains 60 of oil and 40 of suet; but in winter 37 of oil, and 63 of suet. Goose grease contains 68 of oil, and 32 of suet.

Oils and fats contain two acids, the margaric and stearic, and hence their decomposition by alkalies.

The *perspiration* from an animal body consists of water, carbonic, acetic, and phosphoric acids and soda.

One carbonic acid, 10 carburetted hydrogen, and 20 of hydrogen, passed through a red-hot tube form fatty and greasy matter.

Urine contains no less than twelve acidulous combinations, besides sulphur, resin, urea, albumen, and water, when healthy; but in disease, other urinary calculi contains six acidulous combinations, besides magnesia. Silica and urea, uric acid, phosphate of lime and magnesia, and oxalate of iron are the principal.

According to Gmelin, 800¾ parts of *bile* consists of 700 water, 15 resin, 69 picromel (the sweetish bitter matter,) 4 yellow matter, 4 soda, 4 phosphate of soda, 3.5 muriates of soda and potassa, some soda, lime, and magnesia, and a little oxide of iron.

Chemical affinity arises from the various motive powers of atoms, since it is not displayed in the concrete state when the atoms are fixed, but only in the liquid or gaseous state when the atoms have specific motions.—Again, in becoming concrete, the atoms crystallize, and their various crystals are evidence of their peculiar previous motive power, and various subordination to one action, the elastic pressure of air.

What is called chemical attraction may be a mere fullness of motion co-extensive in the same space, as vertical, concentric, &c. &c.

When chemists try to form gums, or sugar of oxygen, and carbon, they get water and carbonic acid.

Gases mix equally, and, when mixed, do not separate. Dalton ascribes this to the particles being of different sizes. And, gases of different gravities become uniformly diffused by mutual absorption. Hence, hydrogen is not generally uppermost in the atmosphere, nor carbonic acid undermost.

The term Gas is German for ghost, and was first applied by Van Helmont, and Mayow discovered their existence, but did not analyse them. All of them owe their existence to their own intestine orbit motion, and if this is artificially or mechanically destroyed, they return to a fluid or solid state.

The solution of fixed bodies by fluids, arises from the atomic motions of the fluid, and as these are increased by heat, or more motion, the solution is more rapid. A lump of dry alum is

thus dissolved in half the time in water at 60 deg., and in a fifth at 120 deg. Fluids of the same degree of motion mingle at once, others in longer time; and some give out, and some absorb heat in mixing. Motion is, of course, opposed to cohesion, and its withdrawal favourable to fixity. This is the repulsion and attraction of modern theorists.

The solution of solids always absorbs heat or motion, and their resolidification gives it out. Fluids have also to dissolve one another, and hence produce heat or cold, as the resulting volume is less or more. Some atoms become fluid or gazeous sooner or later than others, and some fluids and gases have more or less motion in the atoms which compose them, and these circumstances create most of the phenomena of chemistry.

The most popular phenomenon of this science is *Combustion.* It is a case of decomposition and re-composition, and the intermediate effects or accidents are light and heat, so useful, so necessary, and so delightful. A combustible body contains hydrogen and carbon. The air, in which the combustion takes place, consists of oxygen and nitrogen, and if a definite bulk of air is employed, the oxygen disappears, and may be found in the products of the combustion. To understand the process, it is necessary to affix a precise idea to *gas*—which, in a word, is atoms in intense orbit motions, resulting from primary force in right lines, and the re-action of other atoms in the space. Oxygen then consists of such atoms, and, of course, if they are fixed, they transfer their momenta to the bodies fixing them. If to atoms of hydrogen, they form water, with heat to surrounding bodies; and if to carbon, they form carbonic acid, with heat to surrounding bodies. Combustion begins by applying heat or excitement, as lighted paper or a taper to the combustible. This melts the tallow, and raises into gas the latent hydrogen in excitement, that is in orbits too large for the space; and a vacuum is created which the oxygen fills with 8 times the force, becoming fixed by the hydrogen, both in atoms of water and by the carbon in carbonic acid. The oxygen is thus fixed, and the air so far decomposed; but the fixation raises an intense local heat, which, unable otherwise to escape, acts on the atoms of air, and creates in them a general propulsion which we call light, the heat being the concentrated motion at the spot. Whatever carries off the heat, as a pin, a long wick, &c. diminishes the excitement and the light, but the first process continues as long as there is hydrogen and carbon to be evolved by the fixing oxygen; and as long as there is a supply of oxygen to rush in and be fixed. This explication accords with all the conditions. Sometimes the access of oxygen may be assisted, and various circumstances may arise, but essentially and necessarily the causes and effects are precisely as described.—*Editor.*

Berzelius considers combustion as exactly akin to electrical restoration. Lavoisier's theory is derived from Black, and supposed gratuitously to be the extrication of the imponderable and poetical element called caloric.

Others call combustion *the process of the solution of a body in oxygen*, as happens when sulphur or charcoal is burnt; or it is the fixation of oxygen by the combustible body in a solid form, which takes place when most metals are burnt, or when phosphorus inflames; or the production of a fluid from both bodies, as when hydrogen and oxygen unite to form water.

Though the phenomena of common combustion is owing entirely to oxygen combining with hydrogen and carbon, yet chlorine supports the flame of phosphorus, and for a short time a burning taper; so also potassium burns in cyanogen, and heated copper leaf, or iron-wire, in vapour of sulphur. But these are peculiar, factitious bodies, and act on the same principle.

Of course, no substance is destroyed or annihilated by *combustion;* the parts are merely separated, and formed into *new combinations*, and there is no caloric or matter of heat, but merely a transfer of atomic motion.

Nitrates of lime and magnesia imbibe the moisture of the air, & become liquid.

Two principles united, and then separated by a third, afford an example of simple affinity: it consists in displacing one principle by the addition of a third. The body separated is called the *precipitate;* the substance used to separate the compound, is called the *precipitant.* An alkali precipitates metals from their solutions. If an aqueous solution of lime and nitric acid be mixed with a solution of magnesia and sulphuric acid, the magnesia combines with the nitric, and the lime with the sulphuric, but the lime is precipitated in white powder. This is called compound, or double *affinity.*

Again, sulphate of potass cannot be decomposed by nitric acid or by lime, but the union of nitrate of lime effects the decomposition.

Salt and water combines, alcohol added, unites with the water, and the salt falls down. So with alcohol and camphor, by adding water, the camphor falls down.

Forty parts of sea-salt unite with 100 of water, and no more, it appearing that no more of the interstices of the water admit atoms of the salt to move among them.

The clergy were the steady pursuers and patrons of *Alchemy*. Its signs and mystic combinations are found in most of our cathedrals and older churches. For 600 years it was an authorized science, and secretly practised only when the people suspected an intercourse with the devil. The Benedictines and Abbots of Westminster had great fame in these pursuits. Abbot Crumer introduced Raymond Lully to Edward I., and the Alchemists tell us he supplied that prince with six millions of gold. Flammel in the same period was figuring in Paris. Geber, Muller, Dee, Boyle, and even Bacon and Newton lent themselves to this strange infatuation. The last were Peter Woulfe, a very scientific chemist, John Kellerman, and Dr. Wilkinson, of Enfield—while Davy's allegation, that all earths are metallic oxydes, has tended to revive the pursuit.

Alumina, and oxides of iron and tin, are the mordaunts or bases used in dyeing, whose affinity for the material coincides with that for the adjective colour. They are used with sulphuric acid, and the proto-muriate of tin. Indigo, in connection with sulphuric acid, gives blue colours. Archil, madder, &c. red ones. Quercitron, turmeric, &c. yellows. Oxide of iron, and gallic acid, blacks. Other colours are compounds of these.

The best crucibles are Hessian or Cornish.

Vessels and tubes of glass bear the greatest internal expansive force. One ten inches thick has stood a compression of 135 atmospheres.

The most expansible of all substances is a mixture of chlorine and ammonia, called *Detonating Oil*, or chloride of nitrogen. It is an absorption of chlorine gas, by nitrate oxmuriate of ammonia, at 60° or 70°; and a single grain of it is equal to a barrel of gunpowder. It is 1 nitrogen + 4 chlorine, equiv. 158, or per Brande 147.

Dr. TURNER, after a very accurate analysis, determines that it is erroneous to make hydrogen an aliquot part, and that lead is truly 103.5, silver 108, chlorine 35.43, and nitrogen 14 or 14.1.

Arabin, the greater portion of all gums, is—

Carbon	43.81
Oxygen	49.85
Hydrogen	6.2
Azote	.14
	100.0

By Dr. Paris's table, it appears that 10° of the autometer is 4°.73 of real acid, with power of 14.5 grains of sub-carbonate of soda, to saturate 100 acid. The equivalent 480. At 50° it requires 72.5 of soda; at 60°, 87; at 75, 108.75; at 145°, 210; and at 167°.5, 243; the real acid in the two last being 68.5 and 79, and the specific gravity 1.07 and 1.063.

The most intense artificial light is produced by the union of positive and negative electricity on charcoal in a *vacuum*. The positive is therefore to be regarded as the supporter of combustion or oxygen; the negative as the patient, or hydrogen; and the carbon as the atoms unconsumed or electrified. Then, as all light is produced by the same elements, are we not justified in asserting, that light and electricity are identical?

The remains of distilled coal are *coke*, and those of wood are *charcoal*; both of them *carbon* of different compactness.

Light matches are made of three parts of chlorate of potash and one of sulphur or sugar, made into paste with gum-water. The matches are dipped in this paste, and, when touched with sulphuric acid in a bottle, they flame.

The ingenuity of chemists has extended analysis, of late years, to the discovery of the proximate principles, or concentrated alkalies of most of the powerful products of the vegetable world; and the results are important and interesting. They display most of the usual properties of potass and soda, and possess the powers of the substance whence they are derived in a 10th, 20th, or 40th of the original bulk. In their medical use, we arrive at once at the operative principle, to recombine as we think proper. We thus get

MORPHINE, from opium.
QUININE, from yellow bark.
CINCHONIA, from red bark.
BRUCINE, from Angustura bark.
STRYCHNIA, from nux vomica.
PRUSSIC ACID, from bitter-almond rinds.
VERATRIA, from hellebore and colchicum.
GENTIA, from gentian root.
CATHARTINE, from senna.
EMILA, from ipecacuanha.
PIPERA, from black pepper.
ATROPIA, from Belladona.
NICOTIN, from tobacco.
SOLANA, from the solanum nigrum.
HYOSCYMA, from henbane.
&c. &c. &c.

Alphabetical arrangement of some substances, &c.

Acids change purples and blues to red.

Alkalis change blue vegetable colours to green, and brown to yellow. There are three, potass, soda, and ammonia. They unite with acids and form neutral salts, and with oils form soap.

Prussic *Acid* is a deadly poison, obtained from Prussian blue. It is colourless, but smells like peach-flowers, and freezes at two degrees, and is very volatile. It turns vegetable blues into red.

The strength of liquid *acids* is determined by the hydrometer; and of dry *acids*, by neutralizing subcarbonate of soda, or carbonate of lime.

Alcohol is the spirit of wine obtained from the distillation of fermented liquors, and from wine is called brandy; from the sugar-cane, rum; from malt or grain, whiskey and gin. The different flavours arise from the quantity of oil or resin, the bases being alcohol and water. Further distillation produces rectified spirits, the specific gravity of which is about .85; but by further rectification it may be carried to 0.795. Pure alcohol is quite colourless and transparent; it never freezes, but evaporates spontaneously, boiling at 173½ deg. Proof spirits are 0.92. When the gravity is higher, they are under proof; when lower, above proof. Perfectly pure alcohol is about 0.74. The flame is blue, and it leaves no residuum. The vapours consist of carbonic acid and water, and the bulk of water is greater than the alcohol.

Allumina is often called argil.

Alum, or sulphate of allumina, is a salt used as a mordant in tanning, to harden tallow, and in whitening bread. It may be made of pure clay, exposed to vapours of sulphuric acid, and sulphate of potash added to the ley. But it is usually obtained by means of ore called alum slate.

Amalgam is quicksilver combined with metal, generally tin.

Some suppose *Ambergris* to be ancient bees'-wax extricated from strata by the ocean.

The best *Anemometers* are those of Dr. Lind and Dr. Brewster.

Ammoniacal gas passed through burning charcoal, becomes *Prussic acid;* and, when combined with oxides of gold or silver, it renders them fulminating.

The fluids of *Animal* bodies, in their chemical properties, are watery, albuminous, mucous, oleaginous, resinous, saline, gelatinous, and fibrinous. Of these, the solids are continued secretions in laminæ, and fibres or filaments, or tissues.

Argol, or archil, is a colouring substance obtained from *lichens*, used by dyers to improve other colours. It is brought from Elba and the Levant.

Arnatto is a dyeing substance, prepared from reeds which grow in the West Indies and Cayenne.

Arrack is made from the juice of the tops of cocoa-nut and palmyra-trees, At Batavia it is made from *paddee*, rice in the husk.

Sulphuret of *antimony* is used in pharmacy, and called *antimony*, while the metal is called the regulus.

Artificial teeth are made of the tooth of the sea-horse, harder than ivory.

Balloons are filled with carburetted hydrogen gas, and by the Gas Companies for about *5l.*

Nitrate of lime is *Baldwin's* phosphorus.

Bell-metal is three of copper and one of tin.

Blende is a native sulphuret of zinc.

Bleaching is effected by chlorine gas and finished with lime.

Bronzing is a wash by a composition made by grinding gold leaf with honey, which is washed from the gold with water; or it is made by combining sixteen parts of tin, eight of mercury, eight of sal ammoniac, and seven of flour of sulphur. Red lead gives it a copper shade. There are other preparations for bronzing different substances.

Bromine is obtained from sea-water and the ashes of sea-weeds. It is red, poisonous, and very volatile.

Brown's patent engine creates a vacuum, by the alternate admission and combustion of carbonic oxide gas, which he makes from water and coke.

Butter melts at 96°. It is formed by the act of churning, and is not suspended or diluted in the cream, but is generated by contact with the air or some peculiar combination.

Forty grains of mercury, and ten and a half of chloric gas, form *Calomel*.

Carmine is made from cochineal.

Carbonate of soda is formed by passing a current of carbonic acid into a solution of soda, and it becomes a hard solid mass. Its crystals are octahedrous, with prismatic apexes. Carbonate of potash is made like the other, with potash instead of soda.

Caoutchouc, or Indian rubber, is formed of a gum, which exudes by incision from two plants which grow in Cayenne and the Brazils, called *hævia caoutchouc*, and the *jatiopha elastica*; the resinous substance, as it hardens, being formed round clay moulds. The *urceola*, which grows in the Indian seas, also affords this gum, as well as some other plants. Its specific gravity is 0.9335. It is very inflammable; when distilled it gives out ammonia, water, oil, and charcoal. In South America they make with it bottles; and in London, Messrs. Hancock make of it an infinite variety of articles, useful in

cloathing, surgery, and manufactures of singular value in the arts of life.

White oxide of lead is *Ceruse*.

Carbonate of lime is *Chalk*, marble, &c.

Chlorine gas destroys the volatile effluvia of putrefaction and infection; and a solution of the chloride of lime is bleaching powder, and employed for this purpose. A table-spoonful, in a wine-glass of water, spread on a plate, destroys all infection, and purifies the air of sick chambers, infected houses, removes smells from drains, privies, &c.

Chocolate is a preparation from the cocoa-nut, which is ground into powder with lard, made into cakes, and flavoured with spices.

Twenty-one cubic inches of *Chloric* gas and forty grains of mercury form Corrosive sublimate.

Green oxide of *Copper* is the rust of copper.

Acidulous tartrite of potash is *cream* of tartar.

Cream is the lighter unctuous part of milk, which rises to the top; and, by churning, it is further separated into butter and butter-milk. Milk, when sour, may be fermented, and it will yield a vinous liquor; and also take the acetous fermentation. Its constituents are water, oil, curd, gelatine, sugar of milk, muriates of soda and potash, phosphate of lime and sulphur. The cream is thickest in the milk of the cow, goat, and ewe. In women and asses it is whiter and thinner, affording less cream and soft butter. Mares' milk is like cows', but it affords less cream and poor butter.

Disinfection is effected by mixing half an ounce of muriatic and nitrous acid in a quart bottle with an ounce and a half of manganese. The gas being diffused, the bottle may then be stopped for other occasions.

One part of mercury and two of sulphur become *Æthiop's mineral*, now called sulphuret of mercury. When this is exposed to a red heat, with a double portion of sulphur, it forms cinnabar. It consists of 85 parts of mercury and 30 of sulphur.

The *Eau de vie* of the French is white brandy, distilled from wine.

Enamel is made of powdered glass, oxide of lead and tin, and salt of tartar, with coloured substances.

Substances which chemists cannot analyze are called extract, or the *Extractive* principle, and it appears in vegetable bodies chiefly. The red of madder, and the yellow of weld, is called Extractive.

The *Eudiometer* is founded on the principle that the oxygen in the air combines with nitrous gas, by which the bulk of the air is diminished in various degrees, so as to measure the quantity of oxygen previously combined with the azote.

Fluoric acid is a product of Derbyshire spar and sulphuric acid. Its specific gravity is 1.06, and is very corrosive. It etches and corrodes glass, and therefore is kept in leaden vessels.

To prevent mischief from *Explosion* in chemical experiments, it is usual to wrap the vessels in cloth.

A candle makes a distinct flame in the *Flame* of alcohol.

Fulminating powder is 3 nitre, 2 charcoal, 1 sulphur. Preparations of gold, silver, and mercury, are also fulminating.

There are three kinds of *Fermentation*, the vinous, acetous, and putrefactive, which generally succeed each other. The *vinous* fermentation arises from the saccharine principle in sugar or malt. When sugar only, yeast is necessary. At 32 deg. it stops, at 50 deg. is slow, and at 70 deg. becomes acetous. The gas disengaged is carbonic acid, carbon being carried off, and the atmospheric air being not absolutely necessary. Flavour arises from essential oils, and intoxicating properties from alcohol. Thenard thinks that the carbon of yeast abstracts the oxygen, and then the hydrogen and carbon of the sugar combine with the hydrogen and nitrogen of the yeast. The *acetous* follows, and the presence of air is necessary; and chemists conceive that the oxygen of the air combines with the carbon of the vinous fluid. The temperature rises to 85 or 90 deg. The *putrefactive* affects all animal and vegetable substances. Air, heat, and moisture, are necessary. Vegetables give out hydrogen and carbon, and under water hydrogen only, and the residuum is charcoal; but in air the carbon becomes carbonic acid. Animal substances evolve the same and ammonia, also sulphur and phosphorus in their unpleasant odours.

Fluxes, in the large way, are lime or spar, and in the small way alkalies, as nitre and tartar.

The *Foil* of looking-glass is tin and quicksilver. Globes are foliated by the addition of lead.

Gin is malt spirits, flavoured with turpentine, &c. &c. combined with various substances. Geneva or Hollands is made from wheat, and flavoured with juniper berries.

Gallic acid is an astringent principle. It is formed from nut-galls, the nidus of an insect on oak-trees.

Glauber's salt may be resolved analytically into sulphuric acid and soda,

and may be made synthetically from sulphuric acid and soda.

Glue, size, and isinglass, are various forms of animal gelatine. Carpenter's glue is made of the skins of animals; and old animals make the strongest glue.

The violet rays of light tend to produce *Green* colour, by decomposing carbonic acid.

Gum consists of the same as sugar, with two-tenths more oxygen and less carbon.

The Chinese are said to have invented *Gunpowder* soon after the Christian era, and to have used it in common. In 1249 an Arabic author describes its use in fireworks and shells; and it seems to have been used in Europe in ordnance at the beginning of the Fourteenth Century. The Chinese use the same proportions as the English government.

The explosive force of *Gunpowder*, as compared with the pressure of the atmosphere, is estimated at from 1000 to 2000 atmospheres. A cubic inch produces 236 inches of elastic fluid, and if rammed into half its space, it produces 472 inches of gas.

Gunpowder does not explode by heat at less than 600° of Fahrenheit. Its force of explosion, when closely confined, is 6¼ tons to a square inch. When the air is dry it discharges a bullet 1700 feet in a second; and when very damp but 1200 feet.

Ten parts of tin and 100 of copper make *Gun-metal*, or brass guns.

Hungary water is made by distilling 2 lbs. of rosemary with two quarts of spirits of wine.

Hydrogen and carbonic oxide absorb half their volumes of oxygen.

Hydruret of phosphorus inflames spontaneously, and fixes much oxygen.

Jade is a species of talc, and used by the Hindoos and Chinese for god-making.

Iodine is a simple substance of the specific gravity of nearly 5. Its odour is like chlorine, and it is very active. It is of a violet colour, easily evaporates, and melts at 220°. It changes vegetable blues to yellow, and a seven-thousandth part converts water to a deep yellow colour, and starch into a purple. Five volumes of oxygen and one of iodine form iodic acid. It is made from *kelp*; is of a dark grey colour, and metallic lustre, and in its gaseous state is purple. It is a remedy in bronchocele.

Indigo is prepared from the leaves and small branches of an *indigo-fera tinctoria*, of which there are two varieties. It is also prepared in England from *merium*, and isatis or woad. It is the blue, or sulphate of indigo of the dyers, and a very important article.

The scales in hot *Iron* arise from the absorption of oxygen, and are called black oxide.

Carbonate of *Iron* is the rust of iron.

100 grains of *Iron*, burnt in oxygen gas, increase to 130, with great heat and flame, proving the compound nature of the metal.

Isinglass is made of the sounds of sturgeons, a fish which sometimes is 18 feet long, and 700 lbs. weight.

A *Laboratory* consists of a furnace, sand-baths, tables, filtering-stands, sink, cupboards, shelves, crucibles, flasks, retorts, receivers, bottles, a mortar, an anvil, and carpenters' tools; blow-pipe, spatulas, glass tubes, lute-sand, charcoal, weights, scales, and measures; an Argand lamp, thermometers, pyrometer, barometer, hygrometer, hydrometer, Wollaston's scale, &c. &c.

White *Lead* is made by exposing sheets of the metal to fumes of vinegar. *Arbor saturni* is made by suspending a piece of zinc in acetate of lead. Solder is two of lead and one of tin. All preparations of lead are deleterious. When wine is sweetened with litharge, it may be detected by sulphuretted hydrogen, in a black precipitate. Ores of lead in veins occur in siliceous rocks, and sometimes in calcareous.

The best candles for *Light* are those made from vegetable tallow and wax, or cocoa-nut; and the whitest light is produced from the last, or from vegetable oils, duly purified, as in France.

Light arises from the heat of the carbon, &c. in connection with the combining gases, for these alone give little light; but by their condensation afford the intense motion which protrudes the atoms as light.

The flashes of torches used on the stage are made by the pollen, or seeds of *Lycopodium*, or club-moss.

Light matches are made of phosphuret of sulphur.

Liquor of flints, or silicated alkali, is two or three parts of potash with one of silica.

Litmus is made from the archil lichen. Acids turn its purple to red, and alkalies the red into blue.

Crystallized carbonate of *Lime* is calcareous spar.

One grain of sulphate of *Lime* will render 2000 grains of soft water hard.

Fluate of *Lime* is fluor spar.

Lunar caustic is nitrate of silver.

Four pounds of oak bark make one pound of *Leather*, but one pound of catechu powder is equal to eight pounds of oak bark.

Lamp black is prepared by burning resinous substances in close rooms, and collecting the smoke on woollen cloths, which are brushed; and to expel the oil from this soot it is heated to redness in an iron vessel.

Madder is the root of the *rubia tinctorum*, which grows in Europe. It gives a deep red dye, susceptible of changes by alkalies, &c.

Magnesia is made from Epsom salts, by putting potash into a solution in water; the precipitation is magnesia.

Manure owes its stimulating power to salts of ammonia, or volatile alkali. Human soil affords three times as much as that of any animal.

The regulus of *Metals* means the pure metals.

Mercury imbibes one-fifth per cent. of oxygen, and becomes a black powder, and by further oxidation it becomes a red precipitate; it then contains ten per cent. of oxygen.

Two of copper and one of tin make concave *Mirrors* for telescopes.

Minimum, or red-lead, is a double or deutoxide of lead, made from the protoxide or *massicot*. Specific gravity 8.9; and 90 lead with eight oxygen. Lead ore generally contains silver.

Mosaic gold is the peroxide of sulphur and tin.

Morocco leather is goats' skin.

A *Muffle* is an oven of earthenware, which will bear great heat, fitted in a furnace for special processes.

The *Narcotic* principle in the white poppy produces opium, which is its concrete milky juice.

The *Nails* are coagulated albumen and phosphate of lime.

Naphtha is fluid bitumen; petroleum viscid bitumen; and asphaltum is hard bitumen. It is combined with vegetable substance in coals.

The *Nitrogen* in animal substances distinguishes them from vegetables. In decomposing after death, vegetables display their oxygen by their acidity, and animals their nitrogen by their alkalinity in forming ammonia.

Nitric Ether, diluted, is sweet.

The breathing of *Nitrous* oxide gas produces exhilaration and a species of intoxication.

Nitrous acid is aquafortis.

Nitro-muriatic acid is aqua-regia.

Oils are found in eighty or ninety plants or trees, as the olive, linseed, aloes, rape-seed, castor, and from the *ricinus communis*, &c. Wax is produced from the myrica cerifera, which flourishes in North America. It is green, burns with a white flame, and the shrubs yield from 5 to 7 lbs.

Expressed *Oils* are animal and vegetable, and are called fixed oils; their specific gravity varies from 0.9 to 0.97; they boil at 600 degrees. Exposed to the air they absorb oxygen and become solid as transparent drying oils, or opaque fat oils. If burnt and rendered viscid, they make printer's ink; or with fixed alkalis, fat oils.

Volatile or essential *Oils* are distilled with water from vegetable substances, of which they constitute the fragrance. The specific gravity of oil of turpentine is only 0.792, while that of sassafras is nearly 1.1. They consist chiefly of carbon and hydrogen, and evaporate rapidly in open vessels.

Rancid *Oils* convert vegetable blues into red.

If *Oil* is heated to 600 degrees, so as to be consumed in volume, the remains are water and carbonic acid. Water from the hydrogen and oxygen, and carbonic acid from the carbon and oxygen.

Olifiant gas or hydruret of carbon absorbs three times its volume of oxygen, and forms twice its volume of carbonic acid. Water absorbs eight times its volume of oxide of chlorine.

Four grains of *Opium* are equivalent to a tea-spoon, or 100 drops of laudanum.

Opodeldoc is a solution of soap in alcohol, with camphor and volatile oil.

Pakfong is a mixture of 118 zinc, 5 copper, and 13 nickel.

Parchment is prepared skin of sheep or goats.

Pearlash—potash or subcarbonate of potash, is obtained from the ashes of burnt-wood or vegetables: thus, 1000 lbs. of wormwood ashes produce 748 lbs. of potash, stalks of sun-flower 349, fermitory 360, beech 219, &c. The ashes are boiled, and the ley is evaporated in iron pans. American ashes are thought the best.

Pearls consist of concentric layers of carbonate of lime and membrane.

Pearls and mother-of-pearl, are procured from the *mytilus margaritiferus*, a muscle of the Indian Seas, about eight inches long. Fine pearls are also found at Llangollen.

39 out of 40 parts of *Peruvian Bark* are useless; the 40th part, called *Quinine*, possessing all the alkaline properties when extracted by alcohol, and combined with sulphuric acid, as sulphate of quinine.

Pewter is tin alloyed with a 20th of copper, and generally with proportions of lead, zinc, bismuth, and antimony.

In 1782, Dr. James Price, of Guildford, pretended to have discovered the *Philosopher's* stone, and published an account of his experiments; but being a fellow of the Royal Society, he was required on pain of exclusion to repeat

his experiments before Messrs. Kirwan and Woolfe, but after some equivocation, he took poison, and died in August 1783. He presented specimens of his gold to the king and the Royal Society, and pretended that they were made by a red and white powder.

Phosphoric acid is a very abundant substance, and composes mountains with lime in Spain, &c. It also abounds in ores and animal substances.

Various preparations of *Phosphorus* are used to produce quick inflammation. One of the best is made by putting a piece of phosphorus, an inch long, into a small strong phial, and holding it near the candle, until it melts all over the inside of the glass. If it should inflame by the heat, it is to be immediately stopped. When a light is wanted, a common sulphur-match is to be dipped in the phial, and briskly rubbed against the inside. On withdrawing the match, it will generally be found to be inflamed; or if not, this will be sure to take place by rubbing its point over the top of the cork.

Pinchbeck is 3 zinc and 4 copper.

Potassium is formed by exposing an hydrate of potash to a voltaic circle of 500 double plates of four inches, when the substance appears at the negative pole, oxygen being developed at the positive pole. It is also made by melting potash, with iron turnings in a gun-barrel.

One thousand parts of spirits of wine have, by mechanical force, been *pressed* into 934, olive-oil 952, rain-water to 954, and mercury to 997.

Prussiate of Potash is made from the horny hoofs of horses and cattle.

Prussiate of iron is Prussian blue.

The most powerful known poison is *Prussic* acid, called hydrocyanic, and formed from cyanogen, or carburet of nitrogen and hydrogen. The acid in vapour at a moderate heat fills the retort and condenses. A single drop put on the tongue of a large dog kills it instantly. It appears to destroy the nervous system. It reddens vegetables, and its constituents are two volumes of carbon, one of hydrogen, and one of nitrogen; it may also be extracted from bitter almonds. *Prussic* acid is also obtained from green-tea, and souchong is as effectual in poisoning flies as arsenic.

Immersion in sand, mud, or water, *preserves* wood for many centuries.

Salt, corrosive sublimate, sulphate of iron or copperas, of alum, &c. arrest the *putrefactive process* of timber. Drying or seasoning also is a security.

Sir John Pringle determined the power of various salts, to arrest *Putrefaction* or decomposition, as under—

Sea-salt	1
Vitriolated and soluble tartar, and mindererus	2 3
Sal ammonia and saline mixture	4
Nitre, hartshorn, and wormwood	2
Borax	10
Salt of amber	20
Alum and myrrh	30
Bark	120
Camphor	300

But *Pyroligneous* acid, or condensed steam of green wood baked in an oven, is the most powerful antiseptic known; and the smoke of wood fires acts on the same principle.

Ratafia is spirits flavoured with kernels of different fruit.

Realger is a red combination of 80 arsenic and 20 sulphur. Orpiment is another combination.

Rennet is the inner coat of the stomach of young animals, generally that of the calf. It coagulates milk, and produces cheese.

Tartrate of potash and soda is called *Rochelle* salt.

Saliva contains saline matter and albumen, and gastric juice has the same constituents. The *chyme* in the stomach is converted into *chyle* in the small intestines, by mixture with bile and pancreatic secretion. In some animals it has been examined, and is a white fluid, with a sweetish taste, and coagulates. Its principal component is albumen, and the cerous part is like sugar of milk. In animals that feed on vegetables it is more transparent, and the coagulum is more albuminous. It is absorbed by the lacteals, and being mixed with lymph is carried into the venous system.

All the metals are formed into *Salts*.

Thus, there is muriate of gold, which, with tin, makes the purple of Cassius.

Nitrate of silver, called lunar caustic.

Nitrate of copper, which detonates.

Acetate of copper, called verdigris.

Sulphate of zinc, called white vitriol.

Tartrate of potash and antimony, called tartar-emetic.

Muriate of cobalt, which is sympathetic ink, being without colour when cold, but turning green when held to the fire.

Super-oxalate of potash and extract of sorrel is essential salt of lemons.

Antimony and chloric gas form butter of antimony.

The quality of *Saltpetre* is inversely as the angle of refraction, and 5 deg. is called par. 1 per cent. is allowed for every degree above.

Salt of sorrel, or super-oxalate of potash, is what is called *Salt of lemons*. It dissolves the oxide of iron in the ink.

Salt of tartar remains dry at the top

of very high mountains, though it liquifies at their base.

Salt cracks in the fire, owing to water in it being vaporized.

All cattle thrive best if supplied with *Salt*. Horses will consume 6 oz. daily, cows 4, and sheep ½, and do not rot.

Unknown *Salts* are determined to be nitrates by mixing them with muriatic acid, when chlorine is evolved.

Muriate of ammonia is *Sal ammoniac*.

Carbonate of potash is *Salt* of wormwood.

Smelling *Salts*, or carbonate of ammonia, are formed by carbonic acid gas, mixed over mercury with gas from quick-lime and sal ammoniac. Combined with water, it is spirits of hartshorn.

Shagreen is the skin of the houndfish, called the shagree.

Shamoy leather is the skin of the chamois goat.

Shells consist of carbonate of lime and animal gluten.

Soda water is made by combining eight times its bulk of carbonic acid gas, formed in the process, from chalk and dilute sulphuric acid, to which is added some carbonate of soda, under great pressure.

Muriate of *Soda* is table-salt.

Soap is chiefly made of kelp, or the ashes of sea-weeds, dried and burnt in pits. Its refuse is used in making glass bottles.

The best *Soap* is made of olive-oil in the south of Europe. In England it is made of whale-oil or tallow, and to give it a yellow colour rosin is added. Soft soap is made with potash, and hard with soda. *Soap* of ammonia is volatile liniment.

Waters which contain earthy salts decompose common *Soap*.

Spruce-beer is made of water, treacle, and the essence of spruce.

Variety in the constituents of *Soil* is essential to fertility. It is barren when nineteen-twentieths are of one substance; hence lime or marl improves sand or clay.

Water passed over wheat flour, carries off all the *Starch* which falls to the bottom, and leaves the tough substance called *gluten*.

Starch is converted into sugar by boiling for 40 hours equal weights of starch and water with $\frac{1}{100}$th of sulphuric acid, water being re-supplied for evaporation. The acid is neutralized by lime and the sugar crystallizes. 1¼ lb. of potatoe starch produces 1½ lb. of brown sugar.

The liquor of burned *Sulphur* is sulphuric acid, and when combined with soda it forms Glauber's salts; with magnesia, Epsom salts; and with copper and zinc, vitriol: all sulph*ates* when the acid is strongest, or sulph*uric*; or sulph*ites*, when the acid is sulphur*ous*, or weak.

Sugar has latterly been clarified by boiling it at a low heat in vacuo. So the essential oils are purified at a low heat, and their odour preserved.

Sugar is made from linen rags, sawdust, &c. by long boiling with dilute sulphuric acid, and absorbing the acid with charcoal and chalk.

Sulphate of soda is Glauber's salt.

Sulphate of magnesia is Epsom salts.

Sulphate of alumina is alum.

Sulphate of lime is plaster of Paris.

Sulphuret of potash is liver of sulphur.

Saltpetre is nitrate of potash.

Super-acetate of lead is sugar of lead and litharge. Oxide of lead is Goulard's extract.

Sulphate of iron is green copperas.

Sulphate of copper is blue copperas, or blue vitriol.

Sulphate of barytes is ponderous spar.

Sulphuretted Hydrogen, 70.857 sulphur and 29.143 hydrogen, changes litmus and radish to red, is soluble in water, and decomposes soap. It is in all respects like an acid, but it changes the syrup of violets green. It is rather a question about sulphur than about oxygen as the principle of acidity.

Tar is made by making a pile of pine timber, covering it with turf, and then burning it. The smoke, thus confined, descends as tar to a vessel beneath, which fills with tar, while the wood becomes charcoal. About 150,000 barrels of 31½ gallons are imported per annum, from Russia and Sweden.

Tannin, the principle of the substance used in the tanning of leather, is made from nut-galls, which are likewise a constituent of writing ink:—3 parts of nut-galls, 1 of logwood, and 1 of green vitriol, boiled in water, making the best ink.

Tannin is found in nut-galls, bark, catechu, kino, sumach, and old fustic.

A test of genuine *Tea* is a grain and a half of sulphate of iron: genuine green tea gives a bluish tint; bohea, a blackish blue. If adulterated it is all colours.

Tin plates are made by cleaning iron plates with acid, and then dipping them in melted tin.

Tin, united with mercury, is the silvering of looking-glasses.

Tin and antimony are pewter.

Acetic acid is distilled *Vinegar*.

Sulphuric acid is oil of *Vitriol*.

Turpentine is the juice of the *pinus sylvestris*. Venice turpentine of the larch. Canadian of the *pinus balsamea*. And chian is drawn from the

pistuchia terebinthus. The *oil* is a distillation.

The maximum density of *Water* is at 39° 39', and it expands as cooled to 32°, the freezing point; and in freezing further expands, so that a cubic inch of it has displayed a force of above 27,000 lbs.

If *Water* is saturated with a third of its weight of salt, it will still dissolve sugar; and water saturated with carbonic acid will dissolve iron.

The difference between Thames and distilled *Water* is as 1.0000 to 1. Rain-water is equivalent to distilled water.

Water may be saturated with oxygen by the peroxide of barium. When at the specific gravity of 1.45 it acts as a caustic on the skin, and denotes

Zinc and copper make brass, pinchbeck, Dutch gold, &c.

HEAT.

Heat, or varied temperature, and its different effects on different substances, with their varied powers of receiving and transmitting it, afford not only of themselves a prodigious number of curious phenomena, but are the immediate causes of nearly all those phenomena of nature which are connected with the expansions, condensations, changes, and conversions of bodies.

There can be no reasonable doubt that heat is a mere Effect of atomic motion, and that various intensities by percussions, or motions applied, transferred to various atoms and to various combinations, is the cause of all the phenomena of heat.

The knowledge of heat, its causes and accidents, is essential to the study of chemistry or the science of atoms, for we have no access to atoms except by *heat* in some of its forms. The leverage of sharp tools is not fine enough, but in moving atoms by heat, or heating them by motion, for the terms are equivalent, we disturb their relations, separate or decompose them, and thus are enabled to form new combinations. All chemistry may be reduced to this law. The heat or motion we apply is percussion, friction, the motions of already-formed fluids, and of existing gases transferred to the bases of fire. Forms and densities affect motions, and with these modifications, the application of motion to atoms is the whole science of chemistry.

Cold is the mere absence of the motion of the atoms called heat, or the abstraction of it by the evaporation of atoms so as to convey away the motion, or by the juxtaposition of bodies susceptible of motion. Cold and heat are mere relations of fixity and motion in the atoms of bodies.

Dr. Black advanced an odd hypothesis, and imagined that heat was a *property* of certain atoms, which moved from one body to another, and when not in motion, were *latent* in the bodies. This gratuitous idea has prevailed for half a century, and the name of these heat-making atoms is called caloric.

The immediate Cause of the phenomena of heat is motion, and its laws of communication are *precisely the same as those of the communication of motion.*
Davy.

The motions of friction, percussion, fermentation, &c. at once generate heat and electricity. Both, also, arise from action and reaction of oxygen and hydrogen, and the union of these, in each case, produces flame and light. Heat exhibits its excited spheres of light—electricity its spheres of power. One, its changes and decompositions, and the other, its destructions and dispersions. In heat we see the union of oxygen to the excited hydrogen of a combustible, producing fire and flame, and in electricity we see oxygen and hydrogen separated, and then enforcing their own reunion.

The difference between the excitement which produces flame, and that which produces electrical action, appears to arise from the excited hydrogen in flame, being always combined with carbon, when the union takes place with adjacent oxygen, by which the electrical effect is localized; whereas, in electrical excitement, the oxygen or hydrogen in pure elemental atoms, are separated from the adjoining space, and restoration constantly sought and enforced, but obstructed by art, so as to produce the phenomena.

Separation of fluids by distillation, and by cold, illustrates the principle; and the demands for motion or heat from surrounding bodies during all expansions, and its radiations during condensations, are other illustrations which run through all experiments.

The spheres of light, guided by the electrical action of flame, appear to be exactly similar to the double hemispheres of invisible power, resulting from all electrical excitement; and the difference appears to consist in the electrical action being a flow of action *from the space to the centres*, and in the combustion being a flow of action, or a protrusion from the centre to the space; and this exactly corresponds with the light generated by restoration, when the concentrated elements are re-distributed in the disturbed hemispheres.

An electrically-excited candle, when lighted, displays no electricity within

two or three inches of the wick; but when blown out, every part is electrical.—*Desaguliers*.

Blacksmiths commonly light their matches by giving a nail five or six quick strokes with a hammer. Most savage nations produce fire by rubbing two dry sticks together.

Pieces of ice rubbed together melt. Pieces of brass rubbed together in an air-pump, become hot; and a vacuum transmits heat, owing to the radiation of the atoms of the substance which encloses it.

Count Rumford, by boring a cannon within water, so heated it by the friction, that he made it boil, and actually boiled a piece of beef in it. The temperature of nine quarts was raised from 60 to 170 deg. in an hour, and in two hours and a half the water boiled, the whole heat being equal to what would have been produced by nine wax-candles burning the same time.

In strong percussions, the first blow produces the greatest heat, and the greatest change in density; thus, in coining copper at 8.85, the first stroke renders it 8.89, with an increase of heat of 10 deg.; but the second stroke makes it only 8.91, with 4 deg. of heat.

The coarse mechanical methods of exciting heat are called percussion and friction; thus, a hammer struck on metal, or any hard body, makes it hot; but if struck on a friable non-cohering body, which yields to the velocity and disperses by the blow, no heat is produced. The heat produced by friction is well-known to all mechanics, and is diminished either by making the surfaces smooth with unctuous substances or by water, which evaporates, and carries off the excitement.

Different degrees of excitement of their atoms leave the bodies in a state of *solidity;* other proportions break up their solid structure, and convert or melt them into *fluids;* and higher proportions expand them into *vapours and gases*. On the contrary, diminished excitements reduce the gases and vapours to fluids, and further diminution the fluids into solids. In this way, Dr. Faraday condensed even the permanent gases into liquids.

Gas, or aqueous vapour, is formed in the simplest manner, by striking a piece of iron some quick blows with a hammer. The momentum of the hammer is thus transferred to the atoms of iron, which, by reaction from their subparts, radiate invisibly, and the iron affords as a result the sensation of heat, which continues till the momentum imparted has been radiated. If, then, some water, which radiates better than iron, is put on the iron, the water is dispersed in steam or separated atoms. These emerge into a space filled with aerial atoms, and suffer constant deflections in every direction, which ultimately produce small circular orbits of each atom in intense velocity, while the aggregate produces a cloud of steam, which continues till the motions have been parted with, when it is reprecipitated as water. The motions of the hammer are therefore in the steam. All other gas is virtually or actually made in the same way, and the volumes of orbits depend on the excitement, and on the bulk and form of the atoms affected.

The motion of heat does not pass through bodies till it has put their atoms in uniform motion. Some bodies are more susceptible, or contain more susceptible atoms than others. Silver and gold, copper and tin, are among bodies the most susceptible of atomic excitement, and conduct what is called heat the best; other metals have less facility, stones less than metals; brick, glass, dried woods, and charcoal less still; feathers, silk, wool, and hair, least of all bodies. The conducting power is an effect of the continuity of the matter, and is less as the interstices between the atoms are greater. Liquids are dispersed by heat, and therefore are bad conductors. Gases are enlarged by it, and therefore it is exhausted in themselves.

The specific heat, or inherent motion, has been determined for every kind of body by the labours of chemists during the last fifty years. WATER is taken as 1.

Then HYDROGEN GAS is 21 by Crawford, and 9.4 by Dalton.

OXYGEN at 4.7 by Crawford, and 1.3 by Dalton.

AIR 1.8.

AZOTE 0.8 by Crawford, and 1.8 by Dalton.

Aqueous STEAM 1.55 by Crawford, and 1.17 by Dalton.

ALCOHOL, by several averages, 0.6.

LINSEED and WHALE OIL 0.5.

Arterial blood 1.03, and venous blood 0.89.

Farinaceous substances 0.5 and 0.4.

Pit-coal 0.28.

Cinders 0.19.

Glass 1.9.

Iron 0.12.

Silver 0.08.

Gold and Lead 0.05.

The varied susceptibility is proved by mixing the same quantity of fluids at the same temperature; thus, if oil at 50 be mixed with water at 100, the result in heat is 83⅓, and not 75 deg.

The absolute heat, or atomic motion, in equal bulks of water and mercury is as 28 to 1.

As much heat, or atomic motion, is imbibed by a pound of ice, in melting, as would raise a pound of water to 135 degrees. Black made it 140 degrees, which, multiplied by ten, as the whole quantity of heat in water, at 32°, gives 1400° as positive zero, when no heat would remain. Crawford made the absolute zero 1532°; Gadolin made it 1432°; and La Place 3460°; while Desormes makes it only 448°.

The intense motion which exists in atoms when gaseous, is proved by the recondensation, and in this way the condensation of muriatic acid gas has transferred its own intense motion, so as to make mercury boil at 656 deg.

Equal volumes of all gases have the same specific heat or motion: but each gas has a different conducting power, or power of receiving more.

Taking the heat-conducting power of water at 10, ash has 81, elm 32, oak 33, and fir 39.

The densest *woods* are the best conductors of heat. Hornbeam (4 inches 10 lines long and 1 inch thick) conducts 54 deg.; oak 50.5, chesnut 53.7, fir 47.91, poplar 37.59, and cork 17.5 degrees.

The best conductor of heat, or most excitable of the *metals*, is silver; then gold, tin, copper, platinum, steel, iron, and lead.

Hare's fur, elder-down, caoutchouc, wool, and silk, are the worst conductors.

The heat-conducting powers of metals, &c. are

Gold	1000
Platinum . . .	981
Silver . . .	973
Copper . . .	898.2
Iron	374.3
Zinc	363
Tin	303.9
Lead	179.6
Marble . . .	23.6
Porcelain . . .	12.2
Fine clay . . .	11.4

The relative conducting powers of heat, through the following bodies in seconds, are air in 576, lint 1032, wool 1118, raw silk 1284, beaver's fur 1296, eider down 1305, and hare's fur 1315.

Count Rumford considered that the conducting power of heat, in bodies, is as compactness of structure.

Heated liquids rarify and ascend in boiling vessels, by expansion.

Liquids expand by heat in various increasing ratios.

The greatest density of water is at 39.39 F.

Mercury expands between 32° and 212°, 0.02 to 0.018; water 0.0433: fixed oils 0.08; alcohol 0.11.

100 parts of air at 32° expand at 40° to $101\frac{2}{3}$; at 50°, to $103\frac{3}{4}$: at 60°, to 105.8; at 70°, to 108; at 80°, to 110; at 100° to 114; at 120°, to 118; at 150°, to $124\frac{1}{2}$; at 200°, to 135; and at 212°, to 137.4.

The second's pendulum, of 39.139 inches, is lengthened by 30° of temperature the 128th of an inch, or eight vibrations in twenty-four hours.

The boiling point of thermometers should be fixed when the barometer is 29.8 inches.—*Royal Society.*

The proportionate expansions of metals by the same heat are, steel 56, iron 60, gold 73, copper 89, brass 95, silver 103, lead 149.—*Ellicott.*

Fitzgerald made steel 69.5, iron 78.5, brass 112, zinc 157.

Roy made a glass tube in 10 millionths of an inch on a foot length 46569, a glass rod 96944, cast iron 133126, steel rod 137368, brass rod 227136.

Guyton Morveau makes mercury boil at two degrees of Wedgwood, or 642.75 of Fahrenheit. Silver melts at 22 W., 1822.67 F. Gold 32 W., and 2517.63 F. Cast iron 130 W., and 8696.24F. Nickel, platina, and malleable iron 175 W., and 11454.56 F. He makes Wedgwood commence at 517 F., instead of the usual 1077.5. Daniell makes the boiling point of mercury 644, within 1.25 of Guyton Morveau.

Polished steel is a blue colour at 580°, and straw colour at 460°.

A committee appointed by the French Academy to determine the elastic power or volume of steam at high temperatures, have given the following table as results.

Elasticity of Steam.	Fahrenheit.	Elasticity of Steam.	Fahrenheit.
1	212·00	8	341·78
$1\frac{1}{2}$	233·96	9	350·78
2	250 52	10	358·88
$2\frac{1}{2}$	263·84	15	392·86
3	275·18	20	418·46
4	293·72	25	439·34
5	308·84	30	457·16
6	320·36	40	486·59
7	331·7	50	500·60

Oxygen is called the *supporter* of combustion; and other bodies are so called, owing probably to the atoms which they contain, being fixed in like manner by hydrogen excited by previous motion. The products of this union, or combustion, are water, carbonic acid, and vapour.—*See Chemistry.*

When metals are consumed, the calx, or oxide, is heavier than the metal by the quantity of oxygen which has been fixed and combined. The hydrogen evolved by the first, and the continued excitement is called the *inflammable gas;* and no combustion takes place without it, in greater or less proportion. Bodies which do not contain it, as

stones, bricks, &c. are incombustible. Flame, fire, &c. are, therefore, mere effects of the union of two gases, one of which fixes the other.

A cubic foot of oxygen imparts 876 degrees of heat.

One lb. of hydrogen consumes or fixes 7½ lbs. of oxygen, which melts 320 lbs. of ice. A lb. of wax, oil, or tallow consumes or fixes 3 lbs. of oxygen, which melts 104 lbs. of ice.

Combustible bodies will not burn if dipped in a solution of potash, or phosphate of lime, or muriate, sulphate, or phosphate of ammonia, with borax. The alkaline substances arrest the hydrogen, or prevent its combination with oxygen.

Argand's lamp carries a current of air through the wick, by which, more oxygen is fixed; so with bellows.

Kelby's *gas-burner*, of very small holes in a circle, the ascending air preserving an upright cylinder, is said to give equal light, with 30 per cent. less gas.

Solids become incandescent in the dark, at 600° or 700°, but not in daylight till 800° or 1000°.

Neilson states, that the Clyde ironworks save two-thirds of their coals by using heated air for *blasting*, instead of cold air. It is the fixation of *excited* oxygen, and the excitement is probably accelerated.

The vapour of coal tar ignites at 200°.

Newton considered flame as *red-hot smoke;* but modern science regards it as the place where oxygen unites with hydrogen and carbon, and the diminution of volumes transfers an atomic excitement to the carbon, which radiates or protrudes the effect called light.

Water boils, bar. 30 inches, at 212 Fahr., 80 Reaumur, and 100 Centigrade, the head of the scales. Tallow melts 127 Fahr. Fever heat, 112 Fahr.; blood heat 98° Fahr. Temperature of spring-water 50°. Water freezes 32 Fahr.; 0 Centigrade, 0 Reaumur, 0 Fahr., is 14¼ Reaumur below Zero, and 18 Centigrade below Zero, or—14°.5, and—18°.

Ether boils at	104 degs.
Alcohol	173.5
Nitric acid	210
Oil of Turpentine	304
Sulphuric acid—1.8	472
Phosphorus	554
Sulphur	570
Linseed oil	640
Mercury	656

That is, they cannot be made hotter, and their steam, which equalizes their heat, then balances the atmospheric pressure at 30 inches.

Wedgwood's Pyrometers consist of small cylinders of porcelain clay, which permanently contract at great heats, but uncertainly. His scale commences at 1077 deg. of Fahrenheit.

Mr. Daniell has recently determined the expansion of the following bodies, from 1 in length at 62°, to be at 212° and 662°, as under—

Black lead	1.000244	1.000703
Platinum	1.000735	1.002995
Wrought Iron	1.000984	1.004483
Cast ditto	1.000893	1.003943
Gold	1.001025	1.004238
Copper	1.00143	1.006347
Silver	1.001626	1.006886
Zinc	1.00248	1.008527
Lead	1.002323	
Tin	1.001472	

Roy, with Ramsden's microscopic pyrometer, determined the expansion of brass from 32 to 212 on a foot, to be .0227 of an inch; on steel to be .0137; on cast iron .0133; and on a glass rod .0097.

By other experiments of Mr. Daniell, he makes brass melt at 1869; silver 2233; copper 2548; gold 2590; and cast iron 3479, which last, Wedgwood made 20577.

A platinum pyrometer gives different results; by it the degrees are as under:

Silver melts	1823 Fah.
Gold	2518
Cast Iron	8696

By this platina scale, it appears that mercury boils at 643; zinc melts 705; copper 2205; platina 11454.

Mr. Daniell makes the heat in a parlour fire 1141.

In flint and steel, the intense excitement of the steel occasions the particles to take fire.

The sudden compression by a piston of the air, in a cylinder three or four inches long, creates so much heat as to light *amadou;* proving that the air is atoms in orbits, the destruction of which transfers lateral motion enough for this success of the *Tinder Syringe.*

One gallon of water converted into steam will raise six gallons at 50 deg. to the boiling point.

One foot of surface of cast-iron steam-pipe, will heat 200 cubic feet of air 70 degs.

When a bulk of lime and water are combined, the heat is caused by a condensation equal to the bulk of lime, for the mixture is the same bulk as at first.

Acids combining with water condense it, and produce heat.

A lb. of water at 32° and 172, gives 102° the mean. But a lb. of ice at 32°, and a lb. of water 172°, will produce but 32°, owing to ice being, in fact, much colder than water at 32° or more, heat being required to break up its crystallization.

The compression of water by thirty atmospheres, gives out the sixty-sixth of a degree of heat.

A lb. of Coal melts 90 lbs. of ice.

...	Coke	94
...	Wood	52
...	Charcoal	95
...	Peat	19
...	Hydrogen	370

Steam at 212° condensed to ice, gives out 950° heat to an equal quantity of water, owing to the massive accumulation of motion in the volumes.

Though lead melts at 594 by itself, bismuth at 460, and tin at 408 degrees of Fahrenheit, yet, if mixed in the proportions of 5, 8, and 3, they melt at 200 degrees.

If oil, at 100, is mixed with water at 50, the result is 66⅓. Hence, water is conceived to have double the susceptibility or power of receiving heat that oil has.

Water in passing to vapour expands 1696 times, alcohol 659 times, and ether 443 times.

One lb. of mercury at 185°, and one lb. of water at 40°, gives a temperature of 45°, but reversed it is 180°. Hence it is inferred, that there are 28 times more motion among the atoms of water than in those of mercury.

The same heat which raises water 1°, raises oil 2°, owing to the evaporation of the water. The heat required to raise water, oil, and mercury 1° is 28, 14, and 1.

Hemp, cotton, matting, &c. with oil and lamp-black, generate heat, and finally ignite spontaneously, when exposed to air.

Midway up the Andes, the ascenders and descenders meet at an *auberge*, the former half perished with the increasing cold, and the latter overcome by the increasing heat.

The human body, in a healthy state, is generally at 98° of Fahrenheit.

Artificial hot-baths are generally 6° or 7° higher. The king's bath, at Bath, is 116°; the hot-bath 117°, at Vichy 120°; at Barege 122°; Borset 132°; Aix-la-Chapelle 140°; Carlsbad 165°; Baden and Pisey 104°; Buxton 82°; Bristol 74°; Matlock 66°.

Sea-water is seldom below 40 deg.; springs about 45 deg.; and pools and small rivers are at the temperature of the atmosphere.

The heat of an oven applied to a dead human body for twelve days, reduced it from 120 to 12 lbs. The fluids are to the solids as eight or ten to one.

Many public establishments in London, and manufactures in the country, are heated by *hot-water pipes*, and some by hot steam. The economy is that of half the coals and double the heat, besides the luxury of its diffusion through a house or building. The society of Civil Engineers have lately declared in its flavour.

Blagden, and others, in heated rooms at 280 deg. experienced no inconvenience in respiration, and the heat of their bodies did not rise above 99½ deg. Chabert entered an oven at 500 deg. But all metal acquired the full heat; water boiled, &c. Fish, too, actually live in hot-baths up to 158 deg. Trees also grew in a bath at 174 deg.; flowers, near a volcano, at 210 deg.; and water plants are found in boiling springs.

By atmospheric and solar heat, a sunflower, weighing 3 lbs. loses or changes 22 ounces in 24 hours, and a man 2 lbs. by animal heat alone.

A vapour-bath cannot be endured at 120 deg. owing to heated atoms in orbits of a liquid.

As heat is the motion of atoms, then, as all gas is formed by abstracting or absorbing heat, while atoms are dispersed, so ***animal heat*** and animal energy are immediate sequences of the respiration of aerial gas. Thus a man consumes 330 cubic inches of air in his 20 ordinary respirations per minute; and the 28 cubic inches of its oxygen becomes carbonic acid gas, whose specific heat is reduced as 1 to 0.286. This is 1728 inches in 61 minutes, containing 876 deg. of absolute heat, and an absorption of $876 - 195 = 681$ deg. of absolute heat or motion is therefore fixed in the system. In exertions, it is doubled or trebled in quantity.

On going to the top of a high mountain, where the weight of the air is diminished one-tenth, the boiling point of water is somewhat less than 207 deg. On going to the bottom of a deep mine, where the weight of the air is increased one-thirtieth, the boiling point of water is nearly 214 deg.

Water boils at 187 deg. at the top of Mont Blanc.

If, by means of the air-pump, the pressure of air be reduced to one-half, water will boil at nearly 180 deg.

The permanent gases are so, because the liquids to which they can be reduced, boil at the ordinary temperature of the atmosphere.

All hot bodies distribute their heat, or atomic motion, to other atoms around, and this depends on the roughness of the surface, as exposing the greatest number of points to surrounding atoms. Metals radiate the least, and lamp black, paper, and glass, the most.

A thermometer fell from 190 to 68 degrees, in a vacuum, in ten minutes; but, in air, in six minutes. Two tin globes, one painted lamp black and the other bright, the first lost half its heat

in 35 minutes, and the other in 44 minutes.

If the surface of the metals is scratched or roughed, the radiation, of course, is increased, because the excited atoms which cause the heat have more points for distribution to the atoms around. Some of the proportions are lamp black 100, ice 85, polished iron 15, gold, silver, and copper 12. Reflection, in right lines, has contrary power to distribution or radiation by contact, and in this last case it is of course diminished by rarifying the medium.

Taking the radiating power of lamp black at 100 seconds, ice is 85 seconds, lead 19 seconds, iron 15, and tin, gold, silver, and copper 12.

The visible radiations from heated bodies are reflected like light, but they do not pass through transparent bodies.

A naked body, in air, cools in 576 seconds, in wool in 1118 seconds, in cotton in 1046 seconds, in hare's fur 1315 seconds, in raw silk 1284 seconds, and in eider down 1305 seconds.

The heat-making atoms which evolve from an iron-stove at a black heat, are visible in a sun-beam in a dark room.

The metals which retain heat the longest are brass and copper, then iron and tin, and lastly lead.

A thermometer, at a certain elevation, was cooled in air (azote and oxygen) in 100 seconds, in hydrogen in 40, in coal-gas in 70, and in carbonic acid in 112.

Leslie's very ingenions discovery of freezing water by the air-pnmp consisted in absorbing the moisture by a saucer-full of oil of vitriol, and thereby having the expansion without the moisture. When the air is rarified 250 times, water, under the receiver, is cooled down 120°; and at the usual proportion of fifty times to 80 or 100 deg. In this experiment, the motion which kept the water liquid is transferred to the heated sulphuric acid. The water then fixes or crystallizes, but if left in the rarified air, it entirely evaporates after it has become ice.

Leslie, to increase the dryness of air, employed flannel, powdered trap, dried oatmeal, also oil of vitriol; then, by suspending water in a porous vessel over these substances, they kept the surface dry, and increased the evaporation and coldness to 60 deg. He also froze water under the receiver of an air-pump, by placing under it a vessel full of oil of vitriol, and the acid will absorb half its weight of water. It appeared, that when the air was withdrawn from the receiver, water under it parted with its air, and this being absorbed by oil of vitriol, or parched oatmeal, the water freezes. Any degree of cold which is thus produced sinks the thermometer 180 deg.

Water, freed from air, or its more mobile atoms by boiling, should be close stopt in a bottle, if proposed for this experiment. Sulphuric acid, or parched oatmeal, is capable of congealing forty times its weight of water, with rarefaction from twenty to forty. Mercury is solidified in the same manner, so as to bear the stroke of a hammer.

Leslie's experiment explains the principle of fluidity, and freezing and gaseous construction. As the air is exhausted, the gaseous atoms have more room for their orbits, and, in consequence, the gases in the water expand, find room in the receiver, and leave the water. Then, as the water becomes ice, it is evident that its fluidity arose from the gas in its interstices, and that freezing is the departure of the gaseous orbits. But, on the other hand, great cold, *i. e.* withdrawing of motion, or lessening the orbits, may so compress the atmosphere as to cause the gas in water to ascend through the atmospheric gas by difference of gravity; and hence a general frost, which we know is always preceded by ascent of vapour from the earth. Then water increases its bulk in freezing, because the atoms, in separation, fill up the cubic space; but, when uniting in lines or superfices, they occupy more space; wherefore, ice is lighter than water as 92 to 100. The entire operation depends on gas being atoms in orbits, and on the orbits varying in size by more or less motion.

The porons vessels, used for cooling wine, are of African origin, made in Spain, and called Alcarrazas. The atomic motion, or heat, in the water, is diminished by the evaporation at the pores.

Taking air at 32° as 1, then, at 33 below Zero, it is 0.865; at 212° 1.375; at 392° 1.7389; at 572° 2.0976; and at 680°, when mercury boils, air is 2.3125. Hydrogen, and other gases, expand in the same proportion 1-480th to a degree of heat.

Mean gaseous expansions, taken at 32°, the freezing-point, and from this upward, air and all gases increase a 480th for every degree of heat; and, downward, decrease a 480th for abstraction of heat.

Hence, at 512°, they are double in bulk, and, at 448° below Zero, would be half their bulk at 32°.

And, by adding or subtracting the number of degrees from 480, we get the parts or bulk of the same quantity.

At 60° the bulk is 28-480ths larger than at 32° or 508, and the density the 508th,

instead of the 480th. It is a corollary of the above, that all gases are formed by atomic orbits; and fixed bodies, by the partial destruction of orbits.

The decimal of $\frac{1}{480}$ is 0.00208, which is the constant multiplier for any difference of degrees. Thus, at 60°, or 28° above 32°, the expansion is as 0.00208 × 28, or 0.05724, and any bulk at 32°, increased by this 0.05724, its quantity is the bulk at 60°. If 100 cubic inches, at 32°, it is 105.724 at 60°; and if 100, at 60°, it is the 0.05724 less at 32°.

When water freezes, it forms itself into crystals, with interstices, and expands: hence, ice swims, and is eight parts in 100 lighter than water. Some metals and sulphur also expand, when crystallizing, while other bodies contract.

Water, in freezing, evaporates as much as by direct heat, and ice evaporates largely. As evaporation carries off the most mobile atoms, or heat, it produces coldness in the body.

Fordyce, Morveau, and Rumford, proved, that, when the atoms of fluids become fixed by freezing, they increase in weight; lateral motions of fluidity diminishing weight. Davy and Berzelius state that the weight of an atom of azote is twice its specific gravity, as gas.

The bulb of a thermometer, covered with cotton, and moistened with ether, may, by the evaporation, be reduced far below Zero.

Three parts of snow and four of potass, or two parts of snow and three of crystallized muriate of lime, produce 83° of cold.

Two parts of common salt, mixed with two of ice or snow, produce a degree of cold five degrees below the Zero of Fahrenheit. One of sal ammoniac, and two of common salt, with five of snow, make it seven degrees colder. And equal parts of nitrate of ammonia and common salt, with two and a half of snow, reduce it 25 deg. below Zero. Five parts of muriate of lime and four parts of snow freeze mercury. If the muriate of lime be crystallized, or four parts of dry caustic potash be added to three of snow, 50 deg. below Zero may be acquired. Mr. Walker of Oxford produced 91 deg. by applying two parts of sulphuric acid to snow. The whole arises from the transfer of the atomic motions of the adjacent bodies, to effect the melting of the snow, and the cold is inversely as the time in which the melting is effected. It is a case of the transfer of motion.

Salts, in water, lower the freezing point. Thus, 25 per cent. of common salt, in water, lowers its freezing point from 32 deg. to 4 deg. but other salts less. Hence, water frozen at 32 deg. is liquified by 25 per cent. salt, till the thermometer falls to 4 deg. and in proportion for other quantities of salt.

Acids and salts absorb moisture, and as they and the water freeze at different degrees, freezing decomposes them, while the temperature in connection occasions the water not to freeze at 32 deg. Sea-water, therefore, does not freeze so soon as fresh-water, and 25 per cent. of sulphuric and nitric acid lowers the freezing point of the mixture to 7.5 and 7. When snow or pounded ice are mixed with salt, or the acids, these dissolve the solid crystals into fluids, and in converting solidity into fluidity withdraw motion from surrounding bodies, so as in them to be capable of producing a cold of 70 deg. below Zero.

Water, saturated with nitre, loses 17 deg. of heat, and with nitrate of ammonia 46 deg. of heat.

Sea-water freezes at 28°.3.

In freezing-water the crystals join at an angle of 60°.

A cylinder full of water may be converted into ice, by placing it in 5 lbs. of sulphate of soda and 4 lbs. of sulphuric acid, at 36 deg. well mixed.

The ice is extracted for use by putting the cylinder in hot water.

In Bengal, the Hindoos make ice by evaporation, and ice-pits for use in hot weather. The Hindoos also cool water by mixing one part of nitre with two of water.

Melted snow produces about one-eighth of its bulk of water; hence snow, two feet deep, produces three inches of water, when thawed.

Quicksilver melts 39° below Zero.

Ether freezes 47° below Zero.

Wine freezes at 20°.

Extreme cold produces the same perception on the skin as great heat. When mercury is frozen at 40° below Zero, the sensation is the same as that of touching red-hot iron.

Floating fields of ice are oddly filled with pieces of rock, pebbles, shells, and weeds.

The cavern of Surtsheilier, in Iceland, formed of lava 40 feet high, 50 broad, and 4300 long, is filled with pillars of icicles.

A condensed mixture of oxygen and hydrogen, in the proportion of water, passed through a pipe, constitutes the oxy-hydrogen blow-pipe, producing unprecedented degrees of heat; and lime, alumina, and the alkalies are melted, and even volatilized in a few minutes. Rock crystal and quartz are converted into glass. Opal and flint into enamel. Blue sapphire, talc, emerald, lapis la-

zoli, are converted into glass. Gold and diamond are volatilized. Platina and brass wire burn with a green flame. Copper melts without burning; but iron burns with brilliant light. Iceland spar and strontian, and pure lime, give out an amethyst-coloured flame.

When oxygen and hydrogen are burnt, the heat is 2578 deg.; but the same oxygen and charcoal give 2967 deg.; and with iron, zinc, and tin, 5825 deg.—*Despretz.*

Danger from the hydrogen blow-pipe has led to the adoption of a jet of oxygen gas, through the flame of a spirit-lamp, which confers great power.

Every effect of the most violent heat of furnaces may be produced by the flame of a candle or lamp, urged upon a small particle of any substance, by the blow-pipe. This instrument consists merely of a brass-pipe, about one-eighth of an inch diameter at one end, and the other tapering to a much less size, bended, and having a very small perforation for the wind to escape. For philosophical, or other nice purposes, the blow-pipe has a bowl, or enlargement, in which to condense and detain the vapours of the breath, and also several small nozzles, each of different-sized apertures, to be slipped on to the smaller extremity.—*S. Shaw.*

Tallow melts at 92°, spermaceti at 133°, and bleached wax at 155°.

Lamps were used by the ancients, and candles were an invention of the middle ages. At first, wicks were made of hemp, papyrus, and the pith of rushes. Ox and sheep tallow is now preferred.

Wax candles are made very cheap in America, from the berry of a particular species of myrtle, which yields excellent wax, of a green colour. They may also be made by mixing wax with the pulp of potatoes, and also of the butter of the cocoa-nut, and these are excellent.

The safety-lamp is founded on the principle that flame, in passing through iron-wire meshes, loses so much of its heat as not to be capable of igniting inflammable substances around, while flame alone ignites gas. There ought to be above 625 apertures to the square inch. A pin stuck in a rush-light extinguishes it on the same principle of conveying heat from the wick.

Tallow candles were first used in 1290, but wax candles were previously used in churches. The ancients burnt oil in lamps.

A pint of good oil burns above eleven hours in an Argand lamp, with a light three to one greater than a six mould candle; but a pint of the purified rape oil, burnt in Paris, lasts thirteen hours, and gives light four to one greater than a six mould, and a perfect white light.

A lamp, with eight threads of cotton, burns 0.325 oz. of oil in an hour; one with four threads 0.1664 oz.

Genoa is lighted by Naphtha, brought from a spring at Amiano, in Parma.

Taken as to force, the steam of course at higher temperatures has more elastic power, and fills more space. Vapour of ether, at 64°, has a force only of 13 inches of mercury, but at 210 it is 166. So alcohol, at 55°, has a force of only 1, but at 200° it is 53; and at 264° it is 166. Turpentine, at 350°, is 53.8; and at 362° is 62.4.

When steam is first generated by water at 212 deg. its force is that of one atmosphere, its density 1, and its specific gravity 1.26; but at 320 deg. its force is equal to six atmospheres; at 358 deg. to ten; at 416 deg. to twenty; and at 590 deg. to one hundred atmospheres. The different force is created by the principle of heat, which is so much atomic motion transferred to the atoms of water, by which their orbits are enlarged at every increase, and the expansive power increased as the orbits of the atoms enlarge.

Steam at 212 degrees, according to Count Rumford, is 3000 times rarer than water, or 3½ times rarer than air; but great heat will raise it to 14,000 times the bulk of water, equal to five atmospheres. Taking 212 as 1, its force at 100 is .062; at 260, is 2; at 290, 3; at 300, 3.337; at 330, 4.6; and at 350 is 8.

Elastic fluids expand equally with equal increase of temperature.

A bushel of coals will convert into steam 14 cubit feet of water, occupying 1330 times that space as steam, and lifting the atmosphere above the water 1330 times its depth, or 39 millions of pounds one foot high, or with deductions 30 millions; susceptible of further increase by more fuel, carrying it above 212 deg.

In a steam-engine, every nineteen cubic inches of water produces twenty feet of steam, or 1 to 1800 nearly; and this is equal to one horse, and produced by a quarter of a pound of coals. In general, a chaldron of coals works a hundred-horse power for four hours.

One cubic foot of boiler in steam-pipes heats 2000 feet of air 70 deg.; and one square foot of pipe will warm 200 feet of air.

In Cornwall, certain steam-engines have lifted 40 million pounds one foot, with one bushel of coals; and one at Wheel Towan performed 62 millions with an 80-inch cylinder.

Watt's improvement of the steam-engine consisted in his discovery of the power of cold water to condense steam;

and he applied this means in a separate vessel, instead of allowing it to escape, as in the old engines. Four ounces of water will, in a second, condense 200 feet of steam, and reduce their expansive force to one-fifth.

Scotch cannel coal produces the greatest proportion of illuminating gas; then Wigan, Wakefield, Staffordshire, Dean Forest, and Newcastle.

A ton of coals yields 8 or 9,000 cubic feet of gas. Street lamps consume 5 feet per hour, and Argand lamps 4 feet.

10,000 cubic feet of gas is obtained from a chaldron of Newcastle coals, or 590 per cwt. 11,000 cubic feet is produced by a chaldron of Staffordshire coal, or 400 per cwt.

Gas-pipes of half an inch in diameter supply a light equal to 20 candles, one inch 100, two inches 450, three inches 1000.

The gas which lights London is made by four companies, who consume 50,000 tons of coals per annum, which make 400 millions of cubic feet of gas, lighting 62,000 in-door and 7500 street-lamps. Various establishments make one-eighth more.

The gasometers of the London gas companies contain each nearly 20,000 cubic feet of gas, and some have 47 of them; and altogether 1315 retorts. The coals make one-fourth more in bulk of coke, which sells at about 16*s.* the ton.

Sixteen retorts will produce daily 50,000 cubit feet of gas, consuming five tons of coal in the retorts, and costing above five farthings for every ten cubic feet of gas; while it is computed that this will give as much light as half a pound of candles. The same quantity of oil gas would cost 2¼*d.*; while the refuse in making the coal gas is worth a fifth.

In 1830, the gas-pipes in and round London were above 1000 miles.

The degree of light in carburetted hydrogen depends on a due proportion of carbon, for pure hydrogen and oxygen give a very feeble light.

A gas-light equal to one good candle consumes 1.43 of cubic gas per hour; four candles 1.96 per hour; six candles $2\frac{4}{10}$; eight candles 2.95; and for ten candles 3 cubic feet.

Silvester's apparatus for distributing heated air kept the temperature of Parry's ships, between decks, at 60° to 70°; while above the deck the thermometer stood from 0 to 30°, with a consumption of only a bushel of coals in 21 hours.

Count Rumford left 1000*l.* 3 per cent. annuity, the interest of which is to be disposed of every other year to the person who shall communicate any discovery on heat and light.

As heat rises with the rarified air, Count Rumford taught to place grates low, to make chimnies small, and mantle-pieces low.

Four lbs. of beef loses 1 lb. by boiling, 1 lb. 5 oz. by roasting, and 1 lb. 3 oz. by baking; 4 lbs. of mutton loses 14 oz. by boiling, 1 lb. 6 oz. by roasting, and 1 lb. 4 oz. by baking.

A convex lens burns at 25 feet under the surface of the sea in a diving-bell.

Eggs are hatched at 104° of heat.

Wheels and casks are bound by hoops, swelled by heat, the contraction rendering them more binding.

Pits, in the Burman empire, yield four millions of gallons of petroleum, serving for light, and mingled with earth or ashes for fire. Kentucky, &c. affords the same.

Candles, at 30° from the perpendicular, require no snuffing, and give a uniform light.

Salt-water is evaporated in Italy by letting it fall on faggots, which, in dry weather, are covered with crystallized salt.

Deal wood, injected with alumine, is partly incombustible.

Count Rumford, at Munich, prepared a dinner for 1000 persons with only nine pennyworth of fuel. The Count almost devoted his life to improvements in the economy of heat.

A poker laid over a fire concentrates the heat of the passing smoke, and creates a draft through the fire; or it conducts the electricity of the upper side, and increases that of the under side, creating flame.

Fourier calculates that the celestial spaces are 58° below Zero.

Animals die if their vital temperature is increased one-twelfth.

In combustion, 1 lb. of *hydrogen* consumes 6 lbs. of oxygen; 1 lb. of carburetted hydrogen 4 lbs.; 1 lb. of olifiant gas, of olive oil, of wax, and of tallow 3.5 lbs. of oxygen; 1 lb. of phosphorus 1.5,; of charcoal 2 8; and of sulphur 1.36 of oxygen.

And 1 lb. of hydrogen and 6 of oxygen melts about 35 lbs. of ice; 1 lb. of rape oil and 3.5 of oxygen, 124 of ice; 1 lb. of carburetted hydrogen and 4 of oxygen, 85 of ice; 1 of charcoal and 2.8 of oxygen, 50 of ice; and 1 lb. of caoutchouc, 42 lbs. of ice.

The *Centigrade* thermometer divides the 180° of *Fahrenheit*, *i. e.* from 32° to 212°, into 100 degrees; and *Reaumur* divides the same space into 80°. Hence the 32° of *Fahrenheit* is the 0 of *Reaumur* and the *Centigrade*.

ELECTRICITY.

The Electrical power of rubbed amber was known to Thales, and before his time. Theophrastus wrote at large upon it. Gilbert found that 20 other bodies had the same powers. Ho Guericke discovered the sparks, and Dr. Wall first suggested the idea that they resembled lightning. Gray distinguished between electrics and non-electrics, conductors and non-conductors. Dufay established the distinction of vitreous or positive, and resinous or negative electricity, in 1734. He also drew sparks from the insulated human body, and Gray from insulated metals; and hence, the invention of conductors by Boze, and the cushion by Winkler. The Leyden Phial was discovered by Mushenbroek and Van Kleist, in 1744.

Electricity may, in brief, he defined to be oxygen and hydrogen, placed in opposite position, and in loco-motion by certain excitements; there seeking reunion by mutual action and re-action.

But it is generally taught, that electricity is a subtle fluid of its own kind, diffused through nature, but in excess in some bodies, and in deficiency in others; also, that there are two fluids mutually attracting each other, and repelling all matter. Cavendish and Æpinus reduced this last theory to elaborate analysis; but, of course, the value of the analysis is as that of the theory or data.

Perhaps no change among bodies, nor any variety of juxtaposition, or proximity takes place in different bodies, without some atomic disturbance of the usual relations of the atoms which are necessarily co-extensive with space, and are every where in action, or reaction. Disturbances and efforts towards restoring usual equilibrium, are what is called electricity. The equilibrium itself is the fit correlative movements of the atoms by which they equalize the momentum in every equal space, and, as far as possible, render one space in quantity, and degree of local momentum, like another equal space.

When we say that one side is positive, and the other negative, we indicate, of course, positive as to something, or some power; and negative, as to something, or some power; or if two or more agencies are concerned, we indicate a relative defect of some, and an excess of the others; the space being previously full of those elements, and the space itself demanding fulness of power, as a primordial law of nature, in the necessary relations of void space to atoms in power. Certain elements fitly co-mixed, as oxygen, hydrogen, carbon, &c, in space, produce such a law of diffusion as constitutes electricity.

The atmosphere consists, in a special manner, of atoms of oxygen and hydrogen in mixture, and there either is much hydrogen combined, or the nitrogen itself is a compound or mean of oxygen and hydrogen. These elements, or their atoms, by various modes of action and reaction, seem to be susceptible of local separation in spherical spaces; and when separated, they tend to unite again with an atomic force at least equal to that employed in effecting their separation. The separation, in hemispheres of each, and their reunion, with the circumstances connected with these operations, constitute all the classes of phenomena called INFLAMMABLE, ELECTRIC, GALVANIC, and MAGNETIC. Before it was known that the atmosphere consisted of different elements, susceptible of separation, and seeking reunion, the effects were incautiously ascribed to a heating fluid, to one or two electrical fluids, to one or two galvanic fluids, a magnetic fluid, &c. &c. but these now appear to be entirely gratuitous, and to have been mere inventions of defective knowledge.

Electricity appears to consist of a means of separating the oxygen and hydrogen in spheres of action within volumes of air, as electric, and then reuniting them again by *points*, which points, as such, concentrate the action of large surfaces or volumes. The reunion in points is attended by great atomic excitement, and by a redistribution of intense motion in bodies and in the air, producing dispersion and light, just like the same elements in ordinary combustion.

All kinds of electrical action generate at the centre, or place of excitement, a positive and negative state, and then these influences respectively extend to various distances in *hemispheres* in opposite states. A slight excitement generates these double spheres only a few inches in diameter, but a great excitement a sphere of many feet or yards around. In these affected double hemispheres all the phenomena arise, according to distance, and as the bodies in the spheres are electrics or conductors. The collapse of the hemispheres by non-electrics, as wires, &c. puts an end to the electrical state.

The separation of the elements by an electric excitement, which necessarily creates a sphere of reaction, renders the two spaces in a state of contrary power; and this, by electricians, is called *induction*, as to one side or the other side.

In electricity, this distant induction is generally between the surfaces of

conductors of all kinds, till sudden restoration is effected at the poles of the spheres.

Induction is within the volume or plate of the electric, that is, between its two opposed sides. It is most distant when air is the electric. But in a Leyden phial, the inductive energy is within the solidity of the glass, which, in this case, is like the air. So, in galvanism, the inductive distance is a fraction of the distance of the exciting plates, owing to the intervening liquid being itself an imperfect conductor. The intensity is inversely as the diffusion or inductive distance; and hence, for effect, the preference of galvanism.

The opposed sides of the stratum, or sphere, forced into their novel state by the excitement or rubbing, seek, by reaction, to return to their previous mixture: hence, if any body, capable of being moved with less force than the force of reaction, is placed on either surface of the stratum of air, it is carried to the other surface, and said to be *attracted;* and if the parallel plate of air is narrowed in any part by a projection of any kind from either surface, the entire force of action and reaction in the sphere collapses, and is concentrated in that projecting part, and this concentrated force begets a sudden reunion of the sides, accompanied by heat, flame, &c. as a consequence of the remixture of the gaseous elements, which sudden remixture always produces incandescence.

If after separation or disturbance the spheres are undisturbed, a silent restoration takes place, as the air is dry or damp, in ten or twenty minutes. But the centres of the hemispheres are brought near enough, by the hand of one standing on the ground, or a rod from the positive conductor to the negative rubber, when the oxygen and hydrogen reunite, and their hemispheres vanish or instantly neutralize.

In these last cases, the rod or the man becomes the centre of the hemisphere, which is first touched, and the centre of it advances to the other extremity, the hand or the rod; and as the other hemisphere has its centre in the excited place touched, so the approach is distinguished by a mutual collapse, spark, and explosion, and directed to the centres of the hemispheres. If oxygen and hydrogen, thus collapsing, are to be regarded as fluid currents, in that sense there are two electrical fluids. In the formation of the hemispheres by excitement, it would seem that the concentrated oxygen is derived from the adjoining space, and so with the hydrogen.

Restoration, therefore, consists in giving back to each hemisphere, through the centre, its abstracted oxygen and hydrogen. And when the restoration is made at points, or poles, through long wires, the wires necessarily extend the hemispheral action through their whole length, generating a similar opposite hemisphere in the space around each wire, ***for without such correlative action and such hemispheres there can be no excitement.*** All who are practised in electrical experiments, know well these hemispheres in the ebbs and flows of light along chains, &c. &c. both as excitement proceeds, and as sudden restoration takes place.

Hot glass is a conductor, and no longer an electric, by virtue of its neutral resisting substance, since the atomic motion, or heat, mingles its sides by greater force, and prevents a negative and positive side. So, also, thick glass is a conductor, the obstructing substance preventing the formation of a negative and positive side.

A coated bottle, containing boiling water, for the same reason, cannot be charged, till the water is cold or frozen.

Calces of conducting metals, and ashes of conducting vegetables, are non-conductors, or electrics, owing to the weak affinity of the elements.

The passage of the hemispheres around the wires, in discharging a battery, produces a lateral effect on surrounding bodies, and puts light ones in motion.

Positive central action, therefore, begets a negative hemisphere; and negative central action begets a positive hemisphere. Distant conductors, within the negative hemisphere, opposed to the positive centre, endeavour to become negative, and, within the positive, endeavour to become positive. If connected by contact, or by receiving points, they are in the same states as the centre, but the axes of the opposed hemispheres are more distant, or the hemispheres enlarged.

A conducting surface admits no excitement, and therefore extends or bounds the hemispheres of the first excitement. The insulated conductor of a machine, on its positive side enlarges the negative hemisphere on its side; and if extended to the coated surface of glass, plane or jar-formed, the other side becomes negative, as part of the first negative hemisphere.

Electricity of induction means merely the negation of one side of an electric stratum, or sphere, and of the bodies in it, when the other side is positive and the bodies in it, or the contrary. When the restoration of the two sides or hemispheres takes place, the induction, or contrary side, ceases to act, as

by a spark, or the discharge of a Leyden phial.

In aerial electricity, the fluid to be decomposed is the less concentrated, but equally determined atoms of air. To entangle its atoms, we have recourse to friction on the surface of a stratum perpetually renewed on the rubbed electric, and we provide an amalgam to be oxidated, thereby fixing the oxygen of the air, and compelling the hydrogen or nitrogen to seek new combination in distance, or other surfaces in spheres, to which we give the name of induction.

All excitement is by motion in some of its forms, as by friction, blows, heat, expansion, contraction, fermentation, and oxidation.

Smooth glass, rubbed against woollen cloth, becomes positive, and the cloth negative; and so in regard to all the bodies, just as they follow and precede in the adjoining list. Smooth glass, woollen cloth, quills, baked wood, paper, sealing-wax, rough-glass, lead, sulphur, and metals.

Æpinus made a conductor of coated boards to charge a plate of air; but, in fact, all charges are charges of plates of air in effect, and powerful as the plate is more or less perfect. Round conductors produce but a minimum effect, and are most absurd.

The body whose excited portion is the least extent is generally negative. In other words, the body that is most affected by rubbing becomes positive, and that least affected negative.

In all electricity, the positive, or oxygen, is the active power, and this is confirmed by 100 experiments.

Coulomb proves that electrical action is inversely as the square of the distance.

Coulomb determined clearly that the distribution of electricity on conductors depended on the surface and shape, and that the force never entered the body. When spheres are in surface, as 1, 4, 16, 64, or infinite, the force of action is as 1, 1.08, 1.3, 1.65, and never quite 2. And in 2 equal spheres in contact, the force, at every 30° to 180°, was as 0, 1, 4, 5, 6.

The harder of two rubbed electrics always acquires positive electricity.

A conductor of coated paper is as powerful as one of solid metal; and hollow tubes pass charges as well as solid rods.

A thread of gum lac has ten times the power of insulation of a dry silk thread, and two and a half times more than a silk thread covered with sealing-wax.

Cavendish calculated that iron wire conducts electricity 400 million times better than water, and four million times better than sea-water.

The brush and the star on points illustrate many electrical principles. The brush is the positive, or oxygen electricity, seeking the equilibrium with activity through the inductive space; and in a dark room from a fine point, it is a splendid phenomenon. The star is the negative or hydrogen electricity, receiving the oxygen, and effecting a neutralization or equilibrium. The light arises from the union with intensity of action, and the oxygen point generates a force and current, which, in certain toys, amuse the vulgar, and have tended to bring the science itself into disgrace.

Coulomb determined the relative electrical force of twelve globes in line, and found the first to the second as 15 to 10; and of the first, to the sixth or middle, as 17 to 10. And, in twenty-four, he found the first and second as 156 to 100, and the first and twelfth as 175 to 100.

The excitement of all electrical action being the generation of two specific hemispherical atmospheres, whose centres are the excited points, the restoration is also specific, and no other body or substance takes part in the excitement or restoration. Hence it is, that restoration is so indifferent to other bodies, unless they abstract it, and then the affection is not elementary, but mechanical. A vacuum opposes no obstruction, and the restoration is the union of the inflammable with the supporter of combustion. Nor does any gas, or any state of air in the receiver, partake of the action, except as obstructors, or as patients of the intense action, by which they become heated, melted, &c. It is an act of mutual protrusion, in which other bodies are not directly connected in an electrical sense.

In all electrical reasonings, the correlative simultaneous action, positive and negative, should never be lost sight of. If we say any body or space is positive, we should bear in mind, that some other body or space is necessarily negative, and that both are acting in a sphere, in each hemisphere of which the contrary prevails.

All the confusion of electrical science has arisen from considering the cause as an entity, and not as an effect; of action and reaction in other entities, and not merely an effect, but a relative effect; and, in fact, as two effects, always simultaneous, and absolutely necessary.

If the compounded character of air, and the chemical elements, had been known by Gray, Watson, Dufay, Frank-

lin, Nollet, &c. we should never have heard of electric fluid or fluids. Every fact proves that what we call positive electricity is the principle of oxygen, and the negative hydrogen; and that the excitement is their separation in two hemispheres, and the restoration the reunion of those expanded hemispheres, at a point producing motion, heat, and flame.

The experiments at the Royal Institution of London, and at the Institute of France, on these subjects, are far less satisfactory than they might be, if they were not made in subversion to theories about fluids, *per se*, which have, and can have no existence but in imagination. We read, with reasonable doubt, accounts of experiments, in which these *imaginary* fluids are said to run *through* wires and masses of metal, instead of on or over their surface, as aerial excitements; since *we know*, that if the said solids were straws covered with gold-leaf, or pasteboard boxes so covered, the effect would be equally intense. The voltaic current, too, is but a succession of excitements, relative to two ends or poles of a sphere, not a current, in strict language; and the spark or stroke of lightning is but a collapse of vast hemispheres in a point, creating the impression of a line or stream, by its rapidity of concurrent motion.

The theory of Æpinus and Cavendish recognizes principles of attraction and repulsion always impossible, and imagines circumstances, whose contrary is true; hence, this article is for the most part the production of the Editor. Never was mathematical science so abused, as in its application to these false and absurd data. They say, the molecules of the electric fluid *repel* one another, and *attract* those of all matter, while they penetrate the substance of all conductors, and not that of electrics, though there can be neither attraction, nor repulsion.

If an electric and a conducting substance are brought within a few feet of a positive prime conductor, the electric becomes negative on the near side, and positive on the off side, the influence penetrating its mass; but the conductor becomes negative on both sides, whether solid or hollow. If the electric is dipped in water or coated, both sides then become negative, like a conductor, proving that the influence penetrates electrics, and not conductors, and also, that the air, positive on one side, and negative on the other, is an electric; and that, in effect, every conductor is a mere coating to an equal surface of air, which, in fact, is then the electric in action.

Electrics seem to be so, owing to the weak affinity of the oxygen and hydrogen in their substance, by which external excitements operate on the oxygen more than the hydrogen; and conductors are surfaces, whose atmospheres and pores have stronger affinities, and therefore do not permit the influence to pass. Electrics are like water-pipes with holes; and conductors are perfect pipes, which permit no penetration.

The negative and positive, or oxygen and hydrogen currents, unite at the *point* of union in sparks, whose colour and intensity is influenced by the bodies at the point, or rather by their atmospheres.

Deal produces a spectrum; wood and ivory crimson, silvered leather green, powdered charcoal yellow, on rare air green, in condensed air blue, violet, and purple. Obstructions, and local atmospheres, change the results, but the light is like other light.

A vacuum opposes *no resistance*, unlike all solids, and the supporter and inflammable principle unite in a scattered flame; but in the discharge of a jar, a ball of intense light proceeds through the vacuum.

Electric atmospheres are silently destroyed by various causes. 1. The degree of moisture in the atmosphere. 2. The angular points in the machine, or the apartment; and 3, the imperfect insulation. It lasts from half an hour to two hours, but a charged jar often retains dangerous force for some days.

If the coatings are taken off jars or plates when charged, they affect light bodies as before, but the renewal of the coatings gives the usual shock.

Dr. Wollaston induced positive sparks on a card coloured with litmus, and redness, as by an acid, was produced. But a negative wire soon reproduced the blue colour. Water coloured with litmus is changed in like manner.

The burr on both sides a card is palpably occasioned by the opposite currents of oxygen and hydrogen.

The human body, and all animal bodies, are electrical or galvanic combinations, and the excitement is the principle of vitality and energy. The surfaces excited are those of the lungs and the skin, and the lungs fix oxygen, and are positive, while the skin fixes an equivalent of nitrogen, and is negative. The circulations, secretions, &c. are intermediate results, and the action of the heart arises from the proximity of the positive arterial blood with the negative venous blood. The action exhausts itself as it ought in the system, but an external action is often the result of inequalities in the positive and negative. In 2,422 observations differ-

ent persons were 252 times externally positive, 771 were negative, and 339 imperceptible. In sitting at rest, Hemmir found himself 332 times positive, 14 negative, and 10 times imperceptible. Rest and action produce changes, owing to the varied effect of the lungs and skin, and the nervous system appears to act by a separate similar action.—*Four Dialogues.*

Respiration renders the air of rooms negative when persons are at rest, owing to the lungs being in action while the skin is quiescent. School-rooms and sleeping-rooms thus become negative, while the external air is positive.

The torpedo, the electrical eel, and some other fishes of the ray genus, communicate shocks on being touched by the hand, or by electrical conductors. The membranous organs which produce this effect are like the cells of a galvanic trough, or of a bee-hive, and very distinctly marked. The laminæ of muscles, and the fatty cells between them are of similar kinds. But the torpedo, &c. communicate no exterior effect which can be made sensible to the most delicate apparatus.

The shock of the torpedo seldom extends above the touching finger, and never above the elbow, but it can give 20 in a minute. The apparatus has a surface of 15 or 16 square feet, and the force so distributed is that of a very small Leyden Phial. The fish is about 14 inches long and 10 broad, and it gives shocks only when irritated. One gave Spallanzani 316 shocks in 7 min. A torpedo, 4½ feet long, had 1182 plates or columns. Dr. Hunter reports on another with 470. The electrical eel possesses a more powerful electrical apparatus, and gives a decided shock, killing other fish by its power, and even creating a spark between metals which touch it. They are from 4 feet to 15 or 20 feet long.—*Phil. Trans.*

Solid and fluid bodies passing into the gazeous state produce negative and positive electricity as effects of motion.

Black and white silk stockings and ribbons in contact generate great electricity. The former require 1 lb. to 15 lbs. to separate them under different circumstances. Both exhibit very striking phenomena.—*Symmer.*

Breaking certain electrics, as a stick of sealing-wax, produces positive in one end, and negative in the other. So with talc and dry wood.

Dropping powdered electrics on insulated bodies produces excitement. As powdered rosin renders a plate negative, so when the spoon is insulated, the plate is positive. Sulphur, glass, iron filings, gunpowder, chalk, flour, &c. produced the same effect, apparently from mere friction with the air.

Haüy discovered that mesotype, boracete, calamine, prehnete, tourmaline, and topaz, become electrical by heat—boracite having 8 poles. The canse, is the irregular forms of their crystals.

When melted sulphur is poured into an insulated metal cup, on cooling, the sulphur is positive, and the cup negative, for the sulphur has been oxidated by the air, and the cup is within its sphere, and negative. So a metal cup will acquire electricity from having a red-hot cinder dropt into it, because it is then fixing oxygen. And a platina cup, in which an effervescence of acid and chalk takes place, will display electricity by being involved in their electricity, the union of the principles of acids and alkalis, or oxygen and hydrogen, being electrical restorations in all cases, and disturbance preceding restoration.

Heating and cooling, melting and concreting, evaporating and condensing, expanding and contracting, dissolving and effervescing, propinquity with difference of heat or motion conducting power, air, or acids, or alkalies, or water, lying between the surface—all generate electrical disturbances.

Melted wax, rosin, sulphur, &c. display no electricity while heating and hot, but much when cold. When heated a spark sets fire to them.

Gray and Winckler.

The spark from a kite is never above the quarter of an inch, and acute like the phial or galvanic charge, and, for like reasons, the proximity of the surfaces (earth and air) excited.—A kite is always dangerous, and should not be held by the hand.

Read, in 1790, found the atmosphere 241 times positive, and 156 negative, and, in 1791, 423 times positive, and 157 negative. In every 24 hours the strength increases and decreases twice, and is weakest between 12 and 4,—but always varied by heat and cold.

Crosse gives all the circumstances which increase atmospherical electricity.

1. Regular thunder clouds.
2. A driving fog and small rain.
3. Snow or brisk hail.
4. A shower in a hot day.
5. Hot weather after wet; and wet [after dry.
6. Clear weather, hot or frosty.
7. A cloudy sky.
8. A mottled sky.
9. Sultry and hazy weather.
10. A cold damp night.
11. North-east winds.

In May, 1752, Buffon and Dalibard ascertained the identity of electricity

and lightning by insulated rods; and, in June, of the same year, Franklin made the same determination by a kite.

In July, 1752, Romas, of Bourdeaux, also constructed a kite for the same purpose, and subsequently made splendid discoveries with it, before the experiment of Franklin was heard of. Wall, Gray, Nollet, and others, had for years proclaimed the identity, but without experiment. During thunder-storms, Romas obtained sparks like flashes of 9 or 10 feet long, from the string around which metal wire was wound, to the heighth of 1,000 feet.

In a thunder-storm the clouds are mere non-electrics or conducting surfaces, positive with a negative sphere extending to the earth; and the discharge at a point from one large surface to the other is the lightning: or the earth is negative, and the clouds correlatively positive. All bodies in the *sphere* of action are affected, and the stroke produces an extensive lateral action in all conductors, and affects all combinations of oxygen, &c. with weak affinities, as beer, wine, &c. which require the protection of conductors. The cloud, the air, and the earth, resemble the zinc, fluid, and copper, in a galvanic combination.

The Aurora Borealis has, by 20 observers, within a century, been determined to have an elevation of from 100 to 1,000 miles, and 500 as a mean.

The velocity of fire-balls has been computed to be about 30 miles per second, and the heighth from 30 to 90 miles. The great one of 1783 was computed by Cavallo to be 56½ miles high, with a velocity of 33 miles per second. Their report appears to be the collapsing of the air.

Flames of pure hydrogen, wax, oil, and alcohol, conduct only positive electricity.

The flame of a candle placed between two balls, negative and positive, surrounds the negative ball, and make it hot. The flame seems, therefore, to be positively electrified.

The flame of carbonic oxide and of phosphorus go to the positive ball, and are negative; but others go to the negative, and are positive.

Charges sent through a chain or wire shorten it, and thicken it by lateral expansion. They clean a chain or wire from electric substances, explode water, make a depression in soft substances, and an impression on hard ones—all the effect of the lateral hemispheres which accompany the two currents.

Star-like figures of exquisite beauty are made by sprinkling rosin on electrified plates, and are varied by giving to any part an opposite electricity. The plates are 5 lbs. of rosin, 8 oz. of bees' wax, and 2 of lamp-black, melted and spread on a flat surface.

All the metals in fine wires may be oxidated by high charges passed through them in a close vessel. The air loses its oxygen, but if hydrogen or nitrogen is substituted, no oxidation takes place, but only separation of parts, proving that the currents themselves are neutral in chemical action, and that the oxygen is derived from the air by the great heat of the wires, produced by the mere mechanical action of the wires.

In like manner ores may be de-oxydated, quicksilver produced from cinnabar, and quicksilver and sulphur from their vermillion. This, too, must be the effect of mechanical heat, for the constituents of the current must maintain their identity in all cases. Water is decomposed on the very same principle.

Cavendish passed sparks through 500,000 grains of hydrogen, with 1,250,000 grains of air, and obtained 135 grains of water. He then exploded 19,500 grains of oxygen with 37,000 hydrogen, and obtained but 30 grains of acid liquor.

Singer pursued this subject, and by exploding oxygen and hydrogen produced water; with air and hydrogen, water and nitrogen. With chlorine and hydrogen, muriatic acid. With this last and oxygen, chlorine, &c. &c. Then, by exploding muriatic acid, he obtained hydrogen and fluoric acid, the same, &c. &c.

Many bodies retain for different times phosphorescent light, by charges through them, as spar, chalk, lime, amber, crystals, &c.

Watson fired inflammable air and spirits of wine by the spark. The smoke and flame of electrics he found to be conductors. In 1747 he produced a shock by making the breadth of the Thames part of the line of communication, and afterwards this was extended to 8,000 feet of the New River, and 2,800 feet by wire on land. The distances were afterwards increased to 12,276 feet, with perfect and instantaneous results. Not wonderful, because the true distance was but that from the inside to the outside of the glass, and the length of the communication was indifferent. The excited glass generated two proximate hemispheres, which the wires merely extended, and the junction destroyed the hemispheres, while the electrical action passed only through a distance equal to the distance of their diameters. These costly

experiments were made under a mistake of theory. It was supposed there is a fluid or two fluids, and there is no fluid. The hemispheres are created by the two surfaces, and are never more distant than the two.

An insulated cat loses 65 or 70 grains in 5 or 6 hours, a pigeon 35 or 38 grains, and a sparrow 7 or 8 grains.—*Nollet.*

In 1753, Professor Richman, of Petersburgh, was killed by a stroke of lightning, while superintending some observations on the effects of a storm on some elevated conductors.

The great battery at Haerlem consists of 100 jars, with 550 square feet of coating.

Blackwell supposes that electrical attraction and repulsion, simultaneously acting from the sun through the solar system, are the causes of the planetary distances, orbits, rotations, &c. He ascribes the operation to oxygen and hydrogen, and their energy to caloric, as the cause of all motion, the sun being the pole. He is severe on the Newtonian forces, which, however proportioned, he shows could not prevent the fall to the sun in a spiral, with constant acceleration of velocity.

The best preserver against lightning is a lead or copper ridge, instead of tiles on a house, and a *perfect* union of it with lead or metal spouts down to the ground. Rods raised above a building are altogether dangerous, especially if oxidated.

Ruppel, a late traveller, asserts that the violent effects of the Kamsin wind are electrical. He also asserts that the accounts of caravans being destroyed by them are altogether fabulous.

In the Deserts all electric substances crackle on the least excitement. The horses' tails, in beating off the flies, become highly electrical.

Electricity, in excess or deficiency, disturbs the formation of crystals; and a thunder-storm has accelerated tardy crystallization.—*Paris.*

It has been considered probable, by Sir H. Davy, that the power of electrical attraction and repulsion is identical with chemical affinity. If this be true, we obtain at once a solution of the problem, and can explain the action of the electric and galvanic fluids, in disuniting the elements of chemical combinations; for it is evident that if two bodies be held together by virtue of their electrical states, by changing their electricity we shall disunite them. In this view of the subject, every substance, it is supposed, has its own inherent electricity, some being positive, others negative.—*Paris.*

GALVANISM.

The respective powers of metals, in forming a galvanic circle, are: zinc, tin, iron, lead, copper, silver, gold, platina. That is, zinc oxidates and decomposes the intervening fluid and its elements sooner than tin, tin than iron, and platina is the slowest in receiving oxidation from the acidulous fluid.

Amalgam of zinc,*i.e.*zinc and mercury used in electricity, is more readily oxydated than zinc. And cadmium follows tin, bismuth iron, palladium and tellularium silver, and charcoal stands between gold and platina.

Galvanic action is the decomposition of the compound liquid, placed between two plates of various power of conducting heat, and of oxidation; and then connecting the plates with a good conductor, or with wires attached to each plate, and thereby completing the circuit of the two metals independently of the liquid. The acid constituent of the fluid passes to the surface of zinc, usually employed, and the alkaline or hydrogen constituent passes to the copper. The cause and effect are palpable: 1, the zinc is rapidly oxidated; 2, the liquid, if dilute sulphuric acid, becomes sulphate of zinc; 3, the copper accumulates bubbles of hydrogen, till the acid being exhausted the bubbles cease, and the solution itself begins to make zinc deposits on the copper. The action then ceases, but if, in this time, the connecting wire had been broken, electricity would have been displayed at its ends or poles. The air, or whatever contains oxygen and nitrogen or hydrogen, may be decomposed in like manner by two plates, so as to produce slight electrical action.

Galvanism is a universal effect of all bodies in apposition, both of which have different affinities for heat, or for oxygen. Hence what is called thermo-electricity, and all the phenomena of resinous and other plates when approached or superheated. Hence the galvanic action of the earth, from the heat of general pressure, and the galvanism of rocks which generates the ores and fibres of metals in a countless series of ages. Luminated or crystalline structures, as in the Topedo, the Gymnotus, the Loadstone, &c. generate a permanent galvanic action, and of course they neutralize another galvanic current by their poles, and stand at right angles to a current passing near them.

The force is accelerated, if a second copper plate be joined to the zinc, and a second zinc plate opposed to that—the indefinite repetition creating a voltaic battery, whose power depends

on the number of alternations, and the zinc end as flowing *from* is as to the arrangement the *positive pole*, and the copper end, as receiving, the *negative pole*.

In electricity by rubbing, the oxygen follows the greater excitement, and becomes the positive side of an electric, so as to affect the electric *through* its substance, like the liquid between the plates; and this affection of one electric affects the air as another electric, which also is affected *through* its plate or stratum, *i. e.* till it meets with a boundary or conductor. The boundary then is rendered negative by the excess of the positive side, or, if no boundary, there is a sphere of action, positive and negative. When amalgam is used and oxidation takes place, the amalgam creates positive electricity on one side, and negative on the other, both acting in and on the air. But, in galvanism, the fluid is decomposed, and the sphere is the limited breadth of the fluid, which is decomposed with more force than it conducts; as decomposition diminishes, the conducting power increases, and finally terminates the excitement which has been kept up by the circuit.

If we consider that the elements are atoms in fit and determined motion, and various atoms in various motions, that heat is motion, that different metals &c. have various susceptibilities of motion, or, in ordinary language, various powers of conducting heat, and that the oxygen atoms, as having most momentum, combine with the most susceptible metal, we have the tools of electricity and galvanism. For when we form a galvanic arrangement (1) zinc, (2) hydrogen, and a double or treble dose of oxygen in previous neutral fluid actions; and (3) copper or silver, negative as to zinc; and of the two metals zinc more disposed to combine with the oxygen of the fluid than the other. The atoms are thus disturbed, and oxide or sulphate of zinc is formed, and the fixation of the atoms on the zinc surface causes heat, and lets go the hydrogen in the fluid. Connexion of the metals then causes a contrasted actinn in the circuit, the whole oxygen to the zinc and the whole hydrogen to the copper or silver, till the fluid is all decomposed, when the zinc in solution will cover the copper, and the action stop by the mutual neutrality of the substances, and the conducting power of the liquid.

Galvanic or voltaic electricity is merely in another form, a continued excitement and simultaneous restoration in the fluid between the plates also in spheres, and no effect is visibie unless the plates are united by a *better conductor* than the fluid, and then the restoration is effected through the ends or poles of this best conductor. It is a means of exciting electricity without rubbing.

Different acids or fluids vary the powers. Iron in acids is positive in regard to lead, copper, &c., but negative if alkali is used. One metal, with two fluids of different strength, gives out positive electricity to the fluid which oxidates it the quickest. Other bodies besides metals also form weak circles; and muscle and brain, or muscle and nerve form effective circles.

That galvanic as well as electrical transmission is in the space without the conducting wire, is evident from wire carrying with it to the pole elements through which it passes, and which do not penetrate the wire.

In galvanic arrangements the highest effect is when the copper surface is eight times that of the zinc, not the solidity but the surface. And the quantity of the effects are always as the energy of the chemical action.

Ignorance of the nature of electrical action, leads all writers to express surprise that galvanism, which is so intense, performs none of the effects of ordinary electricity in attractions, repulsions, &c. They do not consider the effects as arising from the separation and restoration of the elements carried to a distance in electricity, and acting through that distance by induction in an electric; whereas in galvanism it is a constant production and constant restoration by bodies in contact, though of different conducting bodies, and therefore incapable of effects at greater distance than the exciting bodies themselves.—*Phillips's Dialogues.*

The junction of the poles is exactly similar to the discharge of a Leyden phial. The electricity is in exactly the same state in a voltaic battery, and in a charged jar two hemispheres suddenly collapsing, but in the battery it is generated by the fluid, and *continuous* in its action.

The positive pole of a voltaic battery is that end which the zinc plates face; and the negative pole is that which the copper or silver plates face.

A large battery is 100 pairs of plates four inches square, but one trough of 10 such pairs, or 40 of one square inch effects most purposes. Poles of 20 zinc and copper with moistened flannel are very powerful. The zinc is the positive and the copper the negative pole, taken any where in the trough or pile. The agent is the fluid in the troughs or flannel.

To increase force, a copper plate is

often opposed to each side of the zinc, and the battery consists of one of zinc and two of copper; and sometimes several zinc plates or copper are united.

That of two metals which transmits electricity with the least loss of intensity is positive with respect to the other. *De la Rêve.*

The best test of conducting power is a piece of zinc and silver laid above and under the tongue. Contact at the edges gives a taste, and then if a conductor is interposed, the taste is renewed; but if a bad, or non-conductor there is no taste.

When tapered pieces of charcoal are fixed to the poles of a powerful battery, and brought near, the light is so intense that all the elementary atoms in the air seem to be excited as by solar light, and bodies placed in the stream are instantly melted, vitrified, dispersed, or decomposed. The stream, being the local restoration of two hemispheres, is quite independent of other bodies in lateral proximity; hence it takes place in a good vacuum in azote, chlorine, &c. in water, alcohol, oils, &c.

Atomic motion, or heat, is another consequence of collapsing in the whole line. A wire joining the poles will boil water. The troughs become heated from the negative to the positive pole. Iron and steel wires are fused, and that of platina heated to red or white heat. Thin leaves of metal burn with colours, as gold, bluish, white, and a brown oxide; silver, emerald green, and dark grey oxide; copper and tin like gold with red sparks; lead purple; zinc white with a red fringe, and mercury emits very glowing sparks. Oils, alcohol, &c. are set on fire, and gunpowder exploded.

Water in a tube is decomposed into oxygen and hydrogen by the poles; and in wires of oxidable metals the positive pole becomes oxidated, while the negative gives out hydrogen. *Nicholson.*

Neutral salts are also decomposed in two connected cups by the poles, in each the acid going to the positive cup, and the earthy alkaline or metallic bases to the negative cup.—*Davy.*

If three cups are connected by moistened asbestos, the middle one filled with sulphate of potash, and a blue infusion of potash in the others, then, on the positive pole being put into one cup, the acid from the centre will pass into it, and render the blue infusion red, and the alkali passing into the other will render it green.

In metallic solutions the metal passes to the negative wire in crystals, and the acid into the positive cup.

In a solution of nitrate of silver in the positive cup, and water in the other, a film of silver appears on the connecting asbestos.

If the first (positive) and second be blue infusion, and the other sulphate of soda (negative,) the acid passes through the middle cup, and reddens the first cup, rendering it acid. And by reversing the poles in such cups, the alkali will pass through the middle cup, and render the first green.

All these phenomena are to be ascribed to the lateral action of the currents, which extend the direct action, and give a current of motion to all the similar elements in the course of the travelling sphere round each wire. In some of the instances the poles concur, and in the middle cups the discharge meets. The transmission of elements through one another is similar to a ball passing through a door without moving it.

Sulphuric acid, phosphoric acid, ammonia, oils, alcohol, &c. have also by like means been resolved into their constituents; but it merits notice that all the effects relate entirely to oxygen and hydrogen, serving as a proof that oxygen and hydrogen are the two elements of all electric action.

These phenomena are, however, so irreconcileable to the previous theories about fluids, that during the last 30 years as many theories have been promulgated to reconcile them. The positive oxygen, and the negative hydrogen, with their necessary hemispheres of contrary inductive action, and the collapses of lateral action at the moment of exploding (in this case *continuous*) seem quite sufficient to meet every difficulty.

Owing to the limited sphere of induction in the cells, 1,000 pair of plates are requisite to make pith balls diverge, and affect an electrometer.

Electrical batteries or plates of glass are charged by galvanic batteries; but no experiment has been made on a plate of air.

The muscles of an animal may be excited after death in a surprising manner by galvanism, proving that muscular motion in life is produced by similar natural excitement. Thus the wires of a battery inserted in the ears of an animal, will produce motions of the eye-lids, mouth, &c. The muscles of the whole of a dead body may be made to contract in like manner, to the surprise of spectators.

De Luc's electrical column, made of discs of zinc and gilt paper, is a variety of the galvanic arrangement, but, for want of acid or water, it produces, in a series of 1,000, no higher degree of electricity than to vibrate a clapper

between two bells; but it proves that all surfaces having different degrees of conducting heat, decompose the atmosphere, and become excited by a delicate and minute separation of its oxygen and hydrogen. This action lasts for years.

The pressure of the earth being greatest on the mass lying between the poles of the earth and ecliptic, and the galvanic action greatest, so the loadstone points towards the poles, and specially to the masses in high galvanic action between the terrestrial and ecliptic poles, and hence the duration and variation, and the different variation in different latitudes.

Children's battery consisted of plates 6 feet long and 2 feet 8 inches broad.

The battery of the Royal Institution consists of 2,000 plates, 4 inches square, or 222 square feet.

In 1790, Galvani accidently discovered that the principle of animal action and electricity were the same, and step by step he and Volta arrived at the voltaic battery.

By the late researches of Dr. W. Philip, and other English physiologists, it would appear that when a nerve is divided, so as entirely to intercept the transmission of its action, the place of the nerve may be supplied by a galvanic apparatus. He divided the eighth pair of nerves, which are distributed to the stomach, and are subservient to digestion, by incisions in the necks of several living rabbits. After the operation, the parsley which they ate remained without alteration in their stomachs; and the animals, after evincing much difficuly of breathing, seemed to die of suffocation.—*Paris.*

Batteries, composed of two Conductors, and one imperfect Conductor.

Zinc. Iron. Tin. Lead. Copper. Silver. Gold. Platinum. Charcoal.	Each of these is *positive* to all the metals below it, and *negative* with respect to the metals above it in the column.	*Solutions.* Nitric acid. Muriatic acid. Sulphuric acid. Sal Ammoniac. Nitre. Other neutral salts.

One perfect Conductor and two imperfect Conductors.

Solution of Sulphur and Potass. of Potass. of Soda.	Copper. Silver. Lead. Tin. Zinc. Other Metals. Charcoal.	Nitric acid. Sulphuric acid. Muriatic acid. Any acid.

MAGNETISM.

Œrsted, at Copenhagen, in 1813, found that a galvanic wire, forming the circuit of the poles, exerts an influence on the magnetic needle, inversely as the distance; and that if a circle be described round the wire through the centre of a magnet, the magnet will be a tangent to the circle or stand at right angles to a radius of the circle. When the wire was placed directly *over* the needle, the next, the negative side of the battery, towards which the positive current was flowing, turned to the west; but when placed *under* the direction of the poles, the needle was reversed, and turned to the east. Again, if the wire was placed at right angles, the nearest pole was depressed or raised, as the current in the wire proved east or west. And if the wire is vertical, the needle deviates east or west, according to the current. The whole proving that the wire is like another magnet, which apparently repels the same pole, and attracts the contrary pole, and that electricity and magnetism have the same cause.

The experiments of Ampere, Arago, Davy, &c. made since 1815, have proved that a current of galvanic action changes the position of the magnetic needle from north and south to east and west, or, in other words, that the force of a galvanic current, and that in the magnet, are *tangential* to each other, and at right angles. This was explained on the principle that as each pole had its own determined electricity, so a current of common electrical action would accord with neither, and the consequent reaction would place the two poles at a right angle to the current. Polarity is therefore inferred by them to be the effect of a galvanic current following the heat of the sun, and directing the natural galvanic arrangement of the loadstone into a direction at right angles, or towards the poles.—*Roget.*

M. Ampire, Vanden Bos, and De la Rive, followed the facts of Œrsted, so as by delicate arrangements to connect the magnetism of the earth with the galvanic current, and they opened the road to the late successful course of experiments of Dr. Farady, at the Royal Institution, in proof of this connection.

All doubts of the electrical character of the magnet or loadstone have, however, in 1831—2, been removed, in fact by Dr. Farady, who, in a series of very curious experiments, has succeeded in identifying magnetism and galvanism, by directing galvanic currents at right angles to the direction of powerful

magnets, and has even produced the galvanic currents from terrestrial magnetism, and thus has proved that the same causes or disturbances produce the directive character of both.

The induced electricity which Dr. Farrady produced by magnetic action at right angles acted in one set of experiments on the galvanometer with precision, and gave a slight light on passing charcoal, and convulsed a frog when contact was very suddenly broken.

The conducting wire of the Galvanic poles is impelled to move in the tangent of a circle whose centre is in the axis of the magnet prolonged, and whose radius is a mean proportional of the distances of the centre from the two poles.—*Ampere.*

M. Ampere has made electro-dynamic cylinders, which, in force and action, exactly represent magnets, and may be substituted in place of them. That end in which a current of positive electricity is moving, in a direction like the hands of a watch, is the south pole of a magnet, and the other end has northern polarity.

The theory of Ampere, about electrical currents, to account for variable directions of the needle, as it is under, over, or oblique, is gratuitous and unnecessary. Each wire, before polar contact, has its own sphere, or cylindrical atmosphere, affecting contrarily all bodies around; but the instant the ends are joined, the spheres and cylinders mutually collapse, and while joined, have on each side collapsing hemispheres, positive and negative. Their centre is the wire. If, then, the wire is placed *over* the needle, the needle is one hemisphere, and turned one way; and if *under* the needle, the needle is in the other hemisphere and oppositely directed; or if on any side oblique, &c, the affection is in degree. It has no connection with any rotating currents, but is the ordinary phenomenon of the excitement, and the resulting collapses of restoration.—*Editor.*

It is the same in regard to the conferring of magnetism, for the induction or lateral action varies as the needle is situated within the positive or the negative hemispheres, necessarily created by the two currents, and the communication of north or south poles depends on this relative position, and also, in the results, as the wire passes over their middle, or inclines either way towards their ends.

The action of wires on each other, if brought near, arises from the same cause, since the hemispheres assimilate if contrary, or repel, if the same.

From the nature of the hemispherical induction, we may assume that magnetic needles are similarly electrified in their whole length, positive and negative, or the contrary. Hence, if broken, every part has its own north and south pole. The excitement, too, seems to be atomic between the carbon and metal, and accelerated like the cells of a *voltaic* trough, from end to end.

A needle on one side of the wire is exposed to the negative hemisphere, and turned one way; and a needle on the other side is exposed to the positive hemisphere, and then is turned contrary-wise. So the wire above and below presents an action compounded of both, and the result is oblique but congenial. There is a sphere of action, and the needle is a constant tangent of all the radii.

Magnetism was disturbed, destroyed, and connected with electricity by Franklin, Robins, and Van Marum, who found that a shock passed across a needle in width, while in the magnetic meridian rendered it magnetic, being the very discovery of Oersted, and the effect of the lateral action of the electrical hemispheres in motion.

Owing to the tangential action of a connecting wire on a magnet, and of a magnet on a wire, Dr. Farrady, Mr. Barlow, Mr. Watkins, and Mr. Griffiths, made a variety of ingenious toys to evince this action, a detailed description of which toys fills nearly four numbers of the Tracts for diffusing knowledge.

The magnetic needle, acted upon by the wire of a current, places itself in a direction intermediate to the magnetic meridian, and to the tangent to a circle round the electric current as it is more or less intense.—*Roget.*

In electro-magnetism, a magnetised needle always places itself at right angles, or tangent-wise, to a galvanised wire, so that the poles of each are at right angles to those of the other. The tangent of the needle's deviation, according to angular distance, is the measure of the galvanic power.—*Barlow.*

To produce *magnetic* electricity, pass a long helix of *copper* round a pasteboard cylinder, in which insert a bar of soft *iron;* then, with the two ends, join the poles of a powerful horse-shoe magnet. The effect may also be produced on the galvanometer, by passing a copper plate round the bar, instead of the helix. Iron and copper are essential to the effect of magneto-electric induction, though copper helixes and wires indicate a current.—*Farrady.*

The magnetising effect of the current between the poles results from the commencement of the current, and is not produced when the current is es-

tablished. It appears as though one of two principles was foremost.—*Farrady.*

Iron filings attach themselves in masses to the connecting wire of the poles, but they fall off on breaking contact. Needles placed transversely are permanently magnetized, those *under* the wire, with the positive end to the right, have north poles to the operator, and those above the wire south poles. A Leyden phial or battery does the same. A copper helix improves the force, and it may receive the bar or be wound round it. A horse-shoe magnet has thus been made to raise from 150 lbs. to above 2000 lbs.—*Farrady.*

A current round a needle, viewed endwise, in the direction of the hands of a watch, or a working screw, would make the needle into such a magnet as the dipping needle. A reversed current would produce contrary results.—*Farrady.*

A galvanometer is a magnetic needle placed between the two directing wires of a galvanic arrangement, and the deflection measures the strength.

A cylinder of soft iron, 18 inches long, and one diameter, bent horse-shoe form, galvanised in a helix of copper, will lift, for a very short time, from 50 to 150 lbs.

As ships' iron acts on a needle to neutralize it, the centre of a small circular plate of iron must be placed behind and below the pivot of the compass needle; and the *deviation* from the ship's iron will be destroyed, and the needle rendered active.—*Barlow.*

The poles of the magnet used in generating electricity at right angles govern it as *positive* and *negative*, and clearly prove the identity of the cause and effect.

Knight's compound magnet, belonging to the Royal Society, consists of 450 bar magnets, 15 inches long, one wide, and half thick. A soft cylinder put across the poles requires a force of separation of nearly 100 lbs. Some German magnets are equal to 2000 lbs.

The limbs of a frog are affected by a magnet which lifts 30 lbs.—*Farrady.*

The variation, on June 1821, was 24° 11′ 18″ west; in 1822, 24° 9′ 55″; and in 1823, 24° 9′ 48″. There is a fluctuating daily variation, greatest from 12 to 2, inclined to the west, and believed by Canton and Christie to arise from the heat, which causes a diminution of intensity.

At Petersburgh, the inclination is several minutes greater at 11 forenoon than 11 at night. The intensity the reverse.

It is usual to consider the end of a magnet, which points towards the north of the earth, as the south pole of the magnet itself; since it is inferred that the end points northward, because its magnetism is of a different kind.

If the earth is in an electrical state from all the actions and reactions of its parts; and then, as electricity in motion generates two hemispheres in a wire, may not the same effect result, if the electrified earth moves as the earth moves instead of the current? The reaction would be equivalent in one case to the action in the other, and, hence the resulting terrestrial hemispheral electricity which produces magnetism. A variation would then oscillate between the planes of the two terrestrial motions, or their poles.—*Editor.*

As an electrical current tends to turn a magnet at right angles, if the magnet is fixed, its reaction affects the current, and also the conducting body through or in which the current is passing by its wires; and more sensibly if the body is mobile or fluid. Then, as the reaction of the fixed magnet applies to both currents in their rapidly moving inductive atmospheres, the effects are varied on different sides, and tend to puzzle and surprize those who do not understand the mechanism of a restoring current, and the tangential reaction of the fixed magnet.

M. Arago found, that if a plate of copper and a magnet be suspended in parallel planes, and the plate be rotated, the magnet follows it; or if the magnet rotates, the plate rotates with it. But Dr. Farrady shews that the cause is electrical, and moreover, an example of magnetic electricity, and he used it as means of obtaining positive and negative electricity at pleasure.

Parry's observations on the dip, from lat. 73 to 75, and long. 77 to 112, gave it 86° to 88° 36′, and between long. 91¾ and 103¾ the variation changed from 129 W. to 166 E. He therefore refers the magnetic pole to 72° lat. and 100° long.

In lat. 60° 31′, long. 86° 30′, the dip of the needle was there found by Parry to be 88° 7′, and the variation 48° 33′, W., though the needle scarcely acted.

Raymond Lully, in 1272, speaks of the magnetic needle, as well known for its use to mariners.

The magnetic declination at Pekin is 1° 42′ 57″ W., and the inclination or dip 54° 52′ 1″. The lat. 39° 54′ 9″.

In a word, Farraday has conclusively demonstrated, that in every case where a magnetic current is created, a momentary electric current is induced, at right angles, to the magnetic current; and he proves it, either by mechanically causing a magnetic bar to traverse the axis of a helix of copper-

wire of considerable length,—or, by causing a piece of soft iron, placed in the axis of such a helix, to connect the poles of a horse-shoe magnet, and thus temporarily acquire polarity.

The whole may be called, that division of the science of oxygen and hydrogen, in which the elements are in separation and reunion. Another division presents the same elements in the phenomena of heat, light, and colours, so that to understand the accidents of oxygen, and its antagonist hydrogen, and their intermediate grades of atoms, is to understand the general mechanism of atoms, and of nature.

METEOROLOGY.

Galileo discovered the weight of the atmosphere; Boyle its elastic character, and connection with sound. Priestley, Scheele, and Mayow, in 1774, investigated its chemical relations.

Air, with the barometer at 30 inches, and the thermometer at 55, is 833 times heavier than water, and a cubic foot of it weighs 1.2 ounces avoirdupoise; the weight of a cubic foot of water being 1000 ounces; and a cubic foot of quicksilver 13,600. Air will expand above 13,000 times. Air expands from .00209 at 1 deg., to 1 at 32 deg., 1.0476 at 54 deg., and 1.378 or 1.4 at 180 deg., and all the gases expand in like proportion, or a 480th for every degree.

A bulk of 1000, at 32 degrees, becomes 1152 at 100 degrees, 1376 at 212 degrees, and 2797 at 1000 degrees. It consists of 79 azote or nitrogen, and 21 of oxygen, or vital air in bulk. And their specific gravities being 1.093 and .978, so 100 parts in weight is 77.44 of azote, and 22.57 of oxygen.

Chemists have been much divided about the proportions of oxygen and nitrogen in atmospheric air. Some make it 21 to 79. Some 22 to 78; and others 22.9 and 77.1.

When one volume of oxygen, and four of nitrogen are mixed, it makes five volumes, and has all the properties of atmospheric air. These, and all the gases mix, if placed in connected vessels.

A middle-sized man consumes 46,000 cubic inches, or 26 cubic feet, or nearly a cubic yard of oxygen per day, making 20 respirations in a minute, and 1.6 cubic inch at each.

A cubic foot of air weighs $1\frac{1}{5}$ ounce, hence, a column a mile high, and one inch base, weighs 43.2 ounces, and 15 lbs. is equal to $5\frac{1}{4}$ miles. It diminishes in weight as the distance, and in elastic force or reaction as the bulk or cube of the distance, together as the fourth power; but, in density, as the logarithm of the height; hence, at 44 miles, where it ceases to reflect the atmosphere, its density is considered but a 10,000th of that at the surface.

The size of the volume of the gazeous atmosphere, which rotates with the earth, is an unsolved problem. The twilight proves that it contains vapours dense enough to reflect light as high as 44 or 45 miles. The rarefaction by solar heat, and the rotation, are supposed to render it an oblate spheroid. But, as it would have central force till the two motions were equal; so, as at the surface of the earth, at 3958 miles from the centre, it revolves with a total momentum of only 6101, while the orbit motion is 98000; then $\frac{98000}{6101} \times 3958 =$ the height which it may rotate, or nearly 64,000 miles from the centre, if the peculiarities of elasticity, &c. do not alter this result.

Its height, as a uniform gas, proved, by its pressure of 2158 lbs. to the square foot, would be but 5.6 miles; for a cubic foot weighs but $1\frac{1}{8}$ oz., which gives 29,500 feet in 2158 lbs. But the earth's reaction, and its compression into a narrowing space, and its own elasticity, afford a dilatation as it ascends, in the geometrical ratio of the altitude. Of course, however, this must have *a limit*, and tables which run up the expanding series are fanciful. These shew that a cubic inch of air, at 500 miles high, would fill a sphere 1800 millions of miles in diameter; that at 7 miles it is equal to 4 inches; at 14 miles, 16 inches; at 28 miles, 256; at 42 miles, 4096; and at 49 miles, 16,384. But, probably, no gas is rarer, or much rarer, than hydrogen, or about thirteen times the rarity of common air.

The weight of the atmosphere compresses water about the 22,000th of its bulk: spirits of wine the 15,000th part; and mercury the 33,000th part. The pressure of water, at the depth of 500 fathoms, diminishes the bulk of the water a 27th.

The pressure of the air keeps the gas among the atoms of fluids; and when removed, the gas escapes, and the atoms crystallize, as in freezing water under an air-pump.

Air contains about a 1200th part of carbonic acid gas, and a 70th of aqueous vapour. The causes of marshy and pestilential vapours have not been determined, but they yield to re-agents, as nitric acid, and oxymuriatic fumes.

The weight and elastic force of air raises water, in an exhausted tube, 33 to 35 feet, and quicksilver from 28 to

31 inches, a force equal to 15 lbs. to the square inch, or 20,560 lbs. to the square foot. The weight of the whole atmosphere is thus, 12 quadrillion lbs.

Air, of the density of that near the earth, would be opaque in a thickness of seventeen miles.

Taking platina at 19.5 of water, and air as .0012, a cubic inch of platina is equal to 16,350 cubic inches of air, and to 221,000 of hydrogen as .0735 of air. Consequently, if platina were volatilized into hydrogen, and its atoms were as platina, the 10 millionth of an inch asunder, the same atoms as hydrogen would be the 50th of an inch asunder. Water as steam is at 285 degrees, is 72,000 times its own bulk, *i. e.* 3 million times rarer than platina, and *cæteris paribus*, its atoms nearly the third of an inch asunder.

Mean atmosphere, when not otherwise expressed, is Bar. 30 inches, Fahr. 60°.

Atmospheric air is reduced in bulk as pressure increases, or expanded as pressure is removed. Perkins alledges, that 2000 atmospheres reduced it to a liquid.

The density of the air, compared with the level of the earth, 1, is on

Puy de Dome	583 fathoms	0.9035
Mount Perdue	1185	0.8106
Pic du Midi	1429	0.7768
Etna	1825	0.7196
Chimborazo	3215	0.5468
Gay Lussac	3816	0.5

Gay Lussac ascended $4\frac{1}{4}$ miles, and the barometer was as 0.467 to 1, or 13.5 to 29 inches at the earth, and the thermometer fell 30°.8.

The descent of the barometer one degree centesimal, is by Ramond 540 feet, by Humboldt 528, and by Gay Lussac 570 feet.

Delambre makes the refraction of air, by observation, to be 0.000588094, and Beot and Arago, by experiment, 0.000588768.

Refraction, near the earth, is taken at one tenth in England, and one-twelfth in France.

Humboldt, La Place, &c. consider the fact of an *internal heat in the earth* as fully established, and they ascribe to it the origin and phenomena of volcanoes in connection with metallic bodies, and the access of water to supply oxygen and hydrogen.

At eight feet deep the annual temperature varies only from five to seven degrees; and at four feet, from ten to twelve degrees; while, at one foot, it ranges from nineteen to twenty degrees, and in the open air from 50 to 60 degrees.

Cassini, in calculating the Atmospheric Refraction, considered the atmosphere as five miles high, or variable ten miles. But Kramp and La Place considered it indefinite. Ivory conceives, that cold limits its expansion, and that Newtonion gravity alone would permit indefinite extension. But as the cold prevails, he assigns a height of 50 miles; and after a very elaborate analysis, has formed a new Table of Refractions for every degree, from the zenith, 50 F. 30 Bar.

°	"	°	"
1	1.02	50	69 62
5	5.11	60	100.85
10	10.3	70	159.16
15	15.66	75	214.7
20	21.26	80	320.19
25	27.4	85	593.84
30	33 72	90	34'. 17.5
40	48 90		

At the depth of forty or fifty feet, the temperature of the earth is the same in winter and summer, apparently colder in summer, and warmer in winter. Frost seldom penetrates above a foot into the ground.

The earth is believed to increase, in heat, a degree in every fifteen or twenty yards depth.—*Cordier.*

In the catacombs at Paris, the thermometer through the year is from fifty-two to fifty-four degrees, while on the surface it varies from ninety degrees to 0 deg. In Mexican mines, it stands at seventy-four degrees.

Depths of undisturbed air are like water. In a silver mine in Norway, 309 feet deep, the bottom is covered with snow, and so in other deep caves, owing, as is believed, to the cold air of winter sinking to the bottom.

While air above snow is seventy degrees below the freezing point, the surface of the ground below the snow is only thirty-two degrees.

It has been proved by experiment, in lat. 56 deg. 10 min., by keeping thermometers fixed in the ground at various depths, that frost does not penetrate so deep in the earth as a foot; that at the depths of one, two, and three feet, the lowest temperature, during two years, was, at one foot, 33 deg.; at two feet, 36 deg.; and at three feet, 39 deg.: while the highest was at one foot, 35 deg.; two 52.5 deg.; and three, 52 degrees.

The deepest coal-mine in England is at Killingworth, near Newcastle. The annual temperature at the bottom, 400 yards below the surface, is 77 deg., and at 300 yards, 70 deg.; while at the surface it is but 48 deg., being about 1 deg. for every 15 yards. This may explain the origin of hot-springs, for, at 3300 yards, the heat would be equal to boiling-water, taking 20 yards to a de-

gree. The heat of the Bath waters is 116 deg., hence they would appear to arise at 1320 yards below.

At great depths in the sea, as 4000 feet, the difference is from fifteen to twenty-two degrees between the air and the water at that depth; and at 4680 feet, the water is twenty-six degrees, while the air is 48½ degrees.

Sabine, near Cuba, in lat. 20¼ north, sank register thermometers above 6000 feet, and found the depth of the sea 45½ and 49¼, the surface being from 82¾ to 83.

The lake of Geneva, at the depth of 1000 feet, is always 42 deg., and no variation takes place below 160 feet.

In a lake near Rome, at 490 feet, the thermometer was 44½, though at the surface it was 77 deg. Variation does not take place below 120 feet.

In Scotland, on the surface of Loch Lomond, the thermometer stood at 59.3, but at 90 feet it fell to 43.7, and at 240 was 41.3; and at 690 was 41.1.

Peron relates, that at a depth of 2144 feet in the sea, the thermometer falls to 45°, when 86° at the surface.

The mean annual temperature, at the level of the sea, is 50°, and for different latitudes is as under; the third column showing the height in feet of constant freezing in those latitudes.—

	deg.	feet.
Equator	84.2	15,000
lat. 10	82.6	14,700
20	78.1	13,300
30	71.1	11,500
40	62.6	9,000
50	53.6	6,300
60	45	3,800
70	38.1	1,700
80	33.6	450

The heat, in a general way, may be supposed to arise from the verticity of the sun in the tropics, and then dispersed through the mass.

Of 10,000 rays falling perpendicularly, 8100 reach the earth; 7000 at 50 deg., 2800 at 7 deg., and 5 at 0 deg.

Water seldom freezes till the meridian altitude of the sun is less than 40 degrees.

When the sun is in Aries or Libra, the relative heat of the equator, according to Humboldt, is taken at 1000; at 20 deg. is 940; at 40 deg. 750; and at 60 deg., 500. But, when in Cancer, or Capricorn, is, for the same hemisphere, at 0 deg. 9117; at 20 deg. 1008; at 40 and 50 degrees 1150; at 70 deg. 1175; and at 90 deg. 1250; owing to sun-shine for six months.

The temperature, in equal latitudes, is from 4 to 8 deg. less in the southern hemisphere, supposed to arise from the extended surfaces of water, and from the sun passing through the southern signs in 7¾ days less than the northern.

In latitude 75 degrees, where the mean temperature is only 37 degrees, moss, lichen, grass, dwarf-willow, and sorrel grow. The earth, from the equator to the poles in mountains, from the base to the summit, resemble in their kinds of vegetation. Humboldt says, the proportions in variety are, in the tropics 12, temperate zones one, and frigid one-tenth.

At the equator, on the level of the sea, the mean annual heat is 84.2 deg.; at lat. 45, 58 deg.; in lat. 50, it is 53.6; in lat. 60, 45 deg.; and in lat. 70, 38.1 deg. The vicinity of the poles is assumed to be the freezing-point 32 deg. Between the tropics, the variation from latitude is but 8 deg.; lat. 23 deg. 8 min. being 76; in lat. 45, the average heat in summer to that in winter, is as 120 to 42, and the arctic circle as 102 to 12.

The climate of the southern hemisphere is milder than the north. In May, at Cape Horn, lat. 56, our November vegetation is flourishing.

The sea is colder in the south, and ice extends 4 or 500 miles farther from the South Pole than the North. There are currents from the poles towards the tropics, and then from east to west, in conjunction with the trade-winds.

The medium annual temperature of the whole earth is 50 deg.

Elevation above the level of the sea, or the general level of a country, makes a regular variation in temperature; the first 300 feet makes a difference of a degree, almost as truly as though the height were measured. This arises from the diminution of reflected heat from surrounding objects. After ascending 300 feet, the thermometer falls a degree at 295 feet, then at 277, 252, 223, and 192 feet; so that at 1539 feet of elevation, the thermometer will fall 6 deg. in a general way, but 300 feet per degree is the common rule. On these principles, the limit of perpetual congelation has been theoretically calculated; it is made 15,000 feet at the equator; and from that to 13,000 between the tropics; and from 9 to 4000 between lat. 40 and 59 deg.

The cold and heat of climates depends, also, on the vicinage of seas. At Moscow, the thermometer ranges from 6 to 70, but at Copenhagen, in the same latitude, only from 27 to 65; so, at Vienna, it ranges from 26 to 70, but on the French coast, in the same latitude, only from 41 to 67.

In the gulf of Guinea, the thermometer rises to 130 deg.; and Humboldt thinks that in the air it can never rise above 140; at sea, it never rises above 85 or 88.

The changes of the moon have no connection with the weather. They happen 52 times in the year, and the weather changes 40 times, and hence they often concur.

The coldest hour of the twenty-four is five in the morning, and the warmest is from two to three in the afternoon. The mean heat is from half-past eight to half-past nine. The greatest range is in July, the least in December.

The thermometer is always highest at two o'clock in the afternoon, and lowest before sun-rise.

The average heat at London, in the first sixteen years of this century, was 50.93°. The hottest day, from 1774 to 1817, was in July, 1808, being 93.5, and the coldest, Dec. 25, 1796.

At London, in 1830, the highest point of the thermometer was 90 in June, and the lowest 11 in January. The wettest month was 2.516 in July, and the driest 0.746 in February.

In the past century, the severe frosts in England were in the winters of 1708, 1715, 1730, called the hard frost, 1742, 1754, 1776, 1788, 1796, and 1813.

In the counties round London, the mean temperature and rain, in every month, is as under :—

January ......deg.	36.1 inches	1.483
February	38	.746
March	43.9	1.44
April..............	49.9	1.786
May	54	1.853
June	58.7	1.83
July	61	2.516
August	61.6	1.453
September.........	57.8	2.193
October...........	48.9	2.073
November	42.9	2.4
December.........	39.3	2.426
	48.5	22.199

The most intense cold ever known in London, was in December 25, 1796. The thermometer was at two degrees below zero.

The 14th of January, on an average of years, is the coldest in the year.

The highest temperature in the sun's rays at London, is 154 Fahr., 54.2 Reaumur, 68 deg. Centigrade. The highest of the air 90 Fahr., 26 Reaumur, 32.5 Centigrade.

The mean temperature of the air 49½ deg. Fahr., lowest 11 deg. Fahr. On the earth's surface five deg., and greatest cold in shade two deg. below 0.

The average temperature of the winter months in England is about 40 deg., and of the summer months 65 deg. Devonshire and Cornwall are about four deg. warmer than London.

The annual average of the thermometer at the north and south points of England, Carlisle, and Sandwich, is 48 and 50° ; the maximum, in 1820, being 78 and 83, and the minimum, 12 and 27. London is the same as Sandwich.

The mean temperature of Ireland varies from 47 to 53.

At Kinfaun's Castle, N. B. lat. 56° 23′ the mean temperature, for 1830, was 47.626. The rain 30.85 inches. Coldest day 10°, and hottest 79°. Barometer from 30.53 to 28.73.

The thermometer ranges between 11° and 80; the average being 46.6 in lat. 55° 45′ in Scotland.

At Leeds, Yorkshire, the thermometer was, July 18, 1825, at 92 ; June 25, 1826, at 93 ; and Jan. 2, 1827, at 11°.

The thermometer in Italy ranges between 75 and 96 deg. ; and in winter seldom descends below 40 deg., except in the mountains in the higher Appennines, where it falls to 20 deg.

In New South Wales, the coldest month averages 54 deg., and the hottest 75 deg. It rains 100 days in the year. The north-west wind is a scorching sirocco. The air is generally dry, but the night dews are heavy.

At the volcanic islands of the Gallipagos, half a degree north of the equator, the daily temperature is from 74 to 91 degrees.

The Red Sea is as hot as any part of the world. The thermometer ranges, in 14 hours, from 94 to 112. From Babelmandel to Suez, the coast, for 40 miles inland, is a dry sand, without a blade of grass, or drop of water.

The cold at Tabreez, in Persia, is so intense in February, that persons are constantly frozen to death.—*Porter.*

The average heat of Boston is 47° 3′, of Philadelphia 53° 7′, of Washington 58.1, of Detroit 47.4, of Cincinnati 56.8, of Pittsburgh 54.2, of New Harmony 56.69, Rain 42.85, Charles Town 57 to 60. Richmond 56.1.

Temperature is so variable in South Carolina, that the thermometer sometimes varies 50 degrees in 24 hours ; it ranges no less than 83 degrees in the year. The rain averages 50 inches.

Sudden changes of temperature prevail in Africa. Della-lella records one of 27 deg. in 24 hours.

In Siberia and Hudson's Bay, mercury sometimes becomes solid, proving the cold to be 39 deg. below zero. Wine and spirits also become a spongy mass of ice.

At Bear Lake, Captain Franklin, on February 7, found the thermometer at 58 degrees below zero, and for two days it had been 57.5 degrees.

In the latitude of London, America is 13 deg. colder than Europe, and, in 40 lat., is 8.6 deg. colder than Europe.

In China and Africa, the thermo-

meter rises to 110 and 113, and even to 125 deg. in the sandy deserts; and, in Hudson's Bay, it falls to 50 and 55 deg. below zero.

The mean temperature, per Parry, for the six winter months, was

Winter Island • lat. 66°.30′ — 11°.7
Igloolik • • • • • • • 69° 20′ — 18°.3
Melville Island • • • 74°.45′ — 24°

No snow fell at Melville Island, and only eight inches at Winter Island.

An iceberg, seen by Parry, was above 250 feet out of the water, and, therefore, nearly one-third of a mile thick.

Spring is most rapid in the Arctic regions. The snow disappears, and birds of passage reappear. Then, within a few days, the trees burst with foliage, the ground is covered with flowers, and mosquitoes are thawed in tormenting millions, and subsisting entirely on blood. Horse-flies, sand-flies, &c. &c. render summer less comfortable than winter. Spiders, frogs, fish, &c. are frozen, and as brittle as ice, but revive with the thaw.

The BAROMETER, in the Temperate Zones, varies three inches from 28 to 31, but between the tropics but one quarter of an inch.

Mr. Daniell, the ingenious meteorologist, has procured to be set up, at the Royal Society, a water barometer, in a glass tube, 40 feet high. Its action is most sensitive and instructive, and it precedes the mercurial bar. in all changes a full hour.

100 cubic inches of air, at 57 deg., contain 0.35 of a grain of moisture.

In the temperate zone, the annual evaporation is 37 inches, but in the tropics from 90 to 100; and the mean quantity of rain is in the same proportion.

The mean quantity of water held in a cubic foot of air, in this climate, is 3.789 grains.

The average fall of rain, for the United Kingdom, is about 34 inches, but in the western and hilly counties, is 48 or 50 inches.

The average rain in London for 40 years, between 1777 and 1817, was 20.686 inches. At Paris, in 15 years, 18.649. At Glasgow, in 17, was 21 033; and at Manchester, in 33, was 36.104. At Kendal, 1830, 58.03.

In 1800, the quantity of rain at Cambridge was 25.62; Lynden, Rutlandshire 32.35; West Riding 26.9; Lincoln 24.11; Chatsworth 26.73; Lancaster 35.93; Kendal 48.2, Exeter 24.5; Plymouth 35.5.

At Edmonton, in 1831, the highest ther. was 82°, and lowest 10°; bar. 30.5, and 28 9. Rain 26.8. Winds 232 days westerly; 8 north, 6 south. At Cheltenham, 1831, ther. highest 77.5, lowest 25; bar. 30.26, and 28.52. Rain 34.6. Winds 166 days westerly; 36 north, and 55 south.

The rain at Dublin is about 26 inches and at Cork 36.

On the 9th of October, 1827, there fell at Joyeuse, in France, 29 inches of rain in 22 hours; and in 11 days, 36 inches, double that at Paris in the year.

Humboldt assigns 96 inches of annual rain to the equatorial zone, 80 to lat. 20, 29 to lat. 45, and 17 to lat. 60, as a general average.

From three to four times as much rain falls in a year between the tropics as in higher latitudes; yet the number of days on which it rains, generally increases as the latitude.

The atmosphere of Greece is so dry, that at 86 deg. F. nearly the whole of the animals and vegetables disappear.

At Bombay, in 10 years, 78 inches per annum fell; in 1822, 113 inches; and in 1824, but 34. In the Brazils, in 1821, 280 inches fell; and in Cayenne, 160 inches in February only. At Cumana, it is but eight inches in the year. But in Peru and Egypt, none.

The rainy season between the tropics is when the Sun is in vertical signs; and at other times there is not a cloud for months. North, the rainy months are from April to October; and south, from October to April.

Rain, within the tropics, is not of the drizzling character of rain in the temperate zone, but generally falls in such torrents, as, in other zones, would be called water spouts; and they produce greater floods in a single day, than in Europe in six days. Winter is distinguished from summer, chiefly by the quantity of rain, which, for six months, is often constant for many days together, and lasts a certain number of hours per day, through the whole six months. The rivers, in consequence, overflow; and, in many countries, produce general inundations in all the low lands, which intercept communication, and, on drying off, make the atmosphere very unwholesome.

The bulk, and specific gravity of rain-water, is taken at 60 deg. as 1. Less heat diminishes its bulk, and increases its specific gravity. At 40 deg. one is .9997, and sp. grav. 1.00094. But at 80 deg., the bulk is 1.00242, and the specific gravity .99759; and at 100 deg. is 1.006 and .99402.

Evaporation is as the surface of water, and as the temperature.

There would be no interval between the solid and vapourous states, but for the pressure of the atmosphere. All liquidity is, therefore, the effect of atmospheric reaction, and this is over-

come when the force of the atomic motion of heat exceeds the compressive, generally 15 lbs. to the square inch. It appears, therefore, to be the direct tendency of the motion heat to disperse the atoms of a body, and vapour, steam, or gas, is a conflict between the atoms of the body and those of the atmosphere. Hence it is that water fills the receiver of an air-pump with steam, and that it boils at such low temperature in elevations where the barometer falls considerably. The boiling point would therefore be the measure of the relative force of the atoms of bodies, if their levity or their weight were the same. Thus ether rises against the 15 lbs. at 98°, water at 212°, and mercury at 650°. The relative forces must, therefore, be as 650, 212, and 98, or, the forces being the same, 15 lbs. the weight of the atoms to be moved must be inversely as the same numbers, or $\frac{1}{650}$, $\frac{1}{212}$, and $\frac{1}{98}$.

Atmospheric air, at the freezing temperature, contains from a 200th to a 160th of its weight of water, and double at every 22d or 27th degree. At 52° it contains 100th, at 74 a 50th, and at 98 a 25th. Hence, as cooled, it deposits the excess, and this is THE DEW of clear and calm nights. The earth is more heated by the solar rays than the air, and by night the earth parts with more heat than the air, so as to become lower than the air. In light substances, in contact with the earth, it is often from 15 to 20 deg. Hence, 10 grains of wool, on a grass-plot, in a night, gave 16 grains of dew, 9 on a gravel walk, and 8 on mould. Hoar-frost is frozen dew. Grass is often but 30 deg. when the air is 39, and hence early freezing. *Wells.*

There are seven classes of clouds:

1. Like a lock of hair, or a feather, called *Cirrus.*

2. A cloud in conical round heaps, called *Cumulus.*

3. A level sheet, called *stratus.*

4. A system of small round clouds, *cirro-cumulus.*

5 The concave or undulated stratus, called *cirro-stratus.*

6. The cumulus and cirro-stratus mixed, called *cumulo stratus.*

7. A cumulus, spreading out in cirrus, and raining beneath, called *nimbus.*

The *cirrus* is the most elevated—sometimes as a gauze veil—or parallel threads. Its heighth is from three to five miles. When its streamers point upwards it indicates rain, when downwards, no rain.

Clouds and fogs are the same thing. We see the whole as a cloud, at a distance in the atmosphere, but when the vapour sinks to the earth, or will not rise, and we are immersed in it, we call it a fog. Dew fogs, which hang over fields, are *stratus* clouds; and fogs which involve elevated objects, are *cumulus* clouds.

Fluids consist of minute atoms, separated by gases, and the motion of heat creates this one degree of gasification, while another degree converts the whole in gas or cloud.

Fleecy clouds are seen over head, on the tops of the highest Andes, and on looking over the sea, a stratum of mist is visible at the heighth of 10 or 11,000 feet. Here, however, the sky is clearest, but it loses part of its clearness in passing from the high lands in the Torrid Zone, north or south.

Clouds, in heavy weather, are seldom above half a mile high; but, in clear weather, from two to five miles, and cirrus from five to 7.

Clouds are often of enormous size, ten miles each way and two thick, containing 200 cubic miles of vapour, and sometimes ten times that size.

Crystals of snow are from $\frac{1}{3}$ to $\frac{1}{33}$ of an inch in diameter. Their figures are diversified stars.

The red colour of some snow is ascribed to a fungus which grows on the snow.

The chemical difference between rain and snow-water was determined by Margraaf to be very slight.

Hail-stones fall with a velocity of 60 or 70 feet per second. Rain from 10 to 30 feet. From 3 to 400 tuns of rain fall annually on every acre in England.

Prognostics of weather are mingled with all kinds of superstition and quackery. The barometer, rising with a convex surface, is a legitimate sign of fair weather; and, sinking with a concave surface, a sign of wet. The only correct prognostic is an average of two or three years, and a register of the past; since the average will arrive. Thus, we know that London averages nearly 21 inches of rain, and if 20 have fallen before Michaelmas, there is a high chance the next three months will be dry.

Under the receiver of an air-pump, thoroughly exhausted, rare and dense bodies fall with equal swiftness. Most animals die in a minute or two, but some amphibia live hours. Vegetation stops, combustion ceases, gunpowder will not explode, magnets are equally powerful, smoke descends, water and other fluids turn to vapour, glow-worms give no light, a bell sounds very faintly, heat is slightly transmitted.

When air is halved in an exhausted receiver the hydrometer sinks 50 deg.

and if suddenly reduced to a sixty-fourth, it sinks 300 deg. before moisture expands to fill up the vacuum.

Common air-pumps rarify the air from 100 to 300 times,-the best from 2 to 3000 times.

In 1654, Otto Guericke, of Magdeburg, made the first air-pump, which opened a new field to science, and by the use of which Boyle, in England, acquired fame.

The ordinary pressure of the atmosphere, on a square foot, is 2158 lbs.; on an inch, 15 lbs. equal to 30 inches of mercury, or 34½ feet of water; for a cubic inch of mercury weighs half a pound, and a cubic foot of water 62½ pounds.

Animals soon expire under the exhaustion of a receiver. Frogs continue a long while, also adders, unaffected by the rarefaction of the air. An adder, nine days confined, exhibited signs of animation.

The resistance of the air to a cannon-ball of 2 lbs. weight, with the velocity of 2000 feet per second, is more than exceeds 60 times the weight of the ball.

Dr. Hutton says, such is the air's resistance, that an iron ball 3 lbs. weight, diameter 2.78 inches, thrown with a velocity of 1800 feet, is resisted by a force equal to 176 lbs., above fifty-eight times its own weight. And a ball of 1.05 lbs. discharged with a velocity of 2000 feet, will ascend only 2020 feet, little above half a mile; whereas, in vacuo, it would have ascended 11¾ miles.

Diving has lately been facilitated by the use of an air-pump to force air, for respiration, into an enclosure for the head of the diver, fitted with glasses. The dress is caoutchouc. In this way a diver may walk at the bottom of the sea without even being wet.

The records of stones falling in all ages and countries, are at least 300 in number; and some recent instances are perfectly well authenticated. They fall by the explosion of a mass which probably acquires increase of heat, as it approaches to the earth. The most probable theory respecting them is, that they are independant masses, floating in space, and encountered by the earth and atmosphere in the annual orbit; or they may be generated by the condensation of those self-luminous and rustling clouds which often appear single, or in continued chains, and whose origin and nature are at present so little understood. Their condensation may generate these hard substances with a force of projection, and also the shooting stars. They fall in all latitudes, and, therefore, not from the moon; and their substance has a crystalline character, regular and sudden, not volcanic.

The meteoric stones which fell at L'Aigle, in France, in 1803, contained as below. One, which fell in Yorkshire, consisted of 75 silica, 48 oxide of iron, 37 magnesia, and 2 oxide of nickel. Lists of 2 or 300 have been published by Chladni, King, and Howard, which have been recorded in different countries.

The stones which fall from the atmosphere, called aerolites, or aeroliths, are semi-metallic, and consist of—

Silica	54
Oxyde of Iron	36
Magnesia	9
Oxyde of nickel	3
Sulphur	2
Lime	1

Their specific gravity is 3.4.

Their origin is unknown; the different theories being very unsatisfactory. If they were projections from the moon, as some pretend, they would fall only in the tropical regions.

Of the origin and nature of FIERY METEORS, which visit our atmosphere, nothing is known but the fact.

The meteor of 1783 was believed to be as large as Great Britain, and 120 miles high, and was seen nearly at the same time all over Europe.

Mr. George Pocock, of Bristol, has perfected the application of large kites for rapid travelling by land, for navigation, and other useful purposes. A twelve-foot kite, in a moderate gale of wind, has a force equal to the pull of a man, and, with a brisk gale, to 200 lbs. The force is then as the squares of the lengths; and two kites, one fastened above the other, of 15 and 12 feet will, in a gale, draw a carriage, and 4 or 5 passengers, nearly 20 miles an hour. An extra line enables the operator to diminish the power by varying the angle of the surface with the horizon, and side-lines enable him to vary its azimuth, and the direction of the pull, nearly at right angles to that of the wind. Mr. P. in 1827, travelled in this way from Bristol to London, distancing every other conveyance on the road. Great ingenuity is manifest in every part of this highly-curious invention. The kites are made of varnished linen, and are so contrived as to fold into a small pace.

In addition to the fine original experiments of Pocock on the power of Kites, Captain Dansey has made some decisive ones in proof of the facility of gaining a lee-shore in a stranded vessel. His kite was light canvas, and was constructed with double lines of string, on Pocock's principle.

0.33 of the wind acts on a good sail-

ing-vessel, and 0.4 on a fast-sailer. So that the rate of the vessel divided, 0.33 or 0.4, gives, as quotient, the velocity of the wind, allowing for traverses, &c. &c.

When the barometer at the foot of a hill is 29.5, at 500 feet high it is 20.007; at 1000 feet 28.523; at 2000 feet 27.579; at 3000 feet 26.668; at 4000 feet 25.786; at 5000 feet 24 933. At one mile, 24.7; two miles, 19.78; three miles, 17.32; four miles, 14.5; five miles, 12.15; and six miles, 10.18. If the first quantity is more or less than 29.5, the same differences may be taken.

At 40 miles high, the received law of barometrical pressure would give the mercury but .01 inch.

Ditches and sewers smell before rain because the air is imbued with moisture; just as the perfume of flowers is greatest in the morning and evening, when the air is dampest.

The ground swell, in contradiction to waters raised by the wind, are quite smooth waves, but roll in succession, with great impetuosity.

A meteor as large as the moon, from the south-east to south, was seen all over the western counties of England, on June 29, 1832, at eleven at night. Its light was blinding, for a few seconds.

Air, by compression, has hitherto been reduced only to an eighth of its natural bulk.—*Brockhaus.*

Luminous bands, at vast heights, are often seen stretching from east or west to the zenith and beyond, and about three or four degrees wide. What they are is unknown.

The *ignis fatuus*, and other such luminous meteors, is the combustion of phosphuretted hydrogen, on its ascension into the air, from putrid and fermenting vegetation or soils. Luminous clouds and the aurora borealis are supposed to be of the same nature, the gases in Polar regions being evolved by freezing, and burning in contact with hydrogen in the upper atmosphere.

The Aurora Borealis, though seldom seen in middle Europe, is almost constant in the Arctic and Antarctic regions, covering the whole heavens and eclipsing, by its splendour, the stars and planets. It is accompanied by a rustling, snapping noise, and, taken altogether, is often terrific. It is by various estimates from 150 to 1,000 and several thousand miles high, and flashes and strikes as towards the equator. Some ascribe these phenomena to fluids, as electric or magnetic, of which they presume the existence; but if the atmosphere is a prolate sphoroid, may not the upper parts receive the solar rays? or may not the cold air in the upper regions be rushing mutually from this region to the rare and hot equatorial regions, and give light by mixture, and hence the rustling noise.

In lat. 74—75 the Aurora was called by Parry *Australis*, since it generally appeared southward. It made no noise, and it appeared to be more common from 54° to 60°, and more vivid. Franklin, by doubtful observations, determined the heighth to be 6, 7, and 8 miles. The greatest light was from east to west, and the corruscations darted from south to north. No indication of atmospheric electricity was traced during the winter, and Aurora Australis did not affect the needle.

Showers of frogs, fishes, &c. arise from water-spouts, or spiral eddies in the air, from the meeting of contrary currents, by which a vacuum is created, and masses of the waves of the sea and ponds of water, with their contents, forced to an elevation; and thus being transported to a distance, and there falling, they produce these strange precipitations.

A *water-spout* works like a cork-screw, and moves along like an eddy in agitated water till its force is scattered, and its contents fall; it commonly begins by involving the bottom of a cloud, which descends in it.

Phosphorescent clouds are often seen, but the origin unknown.

On the 12th of November, 1800, between 2 and 3 o'clock in the morning, in the Caraccas, Humboldt saw thousands of fire-balls and falling stars, for 4 hours, passing from north to south. They were also seen 12° south, and, as he learnt, over Europe, even to Greenland and Labrador, distant 5,000 miles.

Wilkins and Lana first suggested the idea of ascending in the atmosphere by rarefied air, and one Galien, of Avignon, in 1755, wrote a pamphlet on Aerostation.

The first balloon of Stephen and Joseph Montgolfier, was a silk bag containing forty feet, which burning paper raised seventy feet. Their next was a bag of 650 feet, which rose 600 feet. Their third was 35 feet in diameter, and was capable of raising 500 pounds. It ascended before the public June 5, 1783. On the 21st of November, Pilatre de Rosier and the Marquis d'Arlandes ascended at Paris, and afterwards others, with air rarefied in the car by heat.

In December, 1783, Messrs. Roberts and Charles ascended in a balloon inflated with hydrogen gas, and after them Blanchard, Morveau, the Duc d'Orleans, and others. In Sep-

tember, 1784, Lunardi made the first human ascent in England.

In January, 1785, Blanchard and Jeffries passed from Dover to Calais, and soon after Rozier and Romain perished in an attempted voyage from Boulogne to England. In September, 1802, Garnerin descended from a parachute near London.

On the 6th of September, 1804, Gay Lussac ascended at Paris to the height of 23,000 feet.

The superfices of a balloon is computed by multiplying the square of its diameter by 3.1416, or the cubic contents is the cube by .5236. Taking atmospheric air at 1.2 oz. to the cubic foot, we have the weight in air, and then, as carburetted hydrogen gas weighs 0.2, the weight multiplied by 0.2 gives the power of ascension.

In a balloon, the barking of dogs on the ground may be heard at an elevation of 3 or 4 miles. On Table Mountain, a mile above Cape Town, every noise in it, and even words, may be heard distinctly.

The air collected by Gay Lussac, at the heighth of 6,636 metres, was found to have EXACTLY the same proportion of constituents as on the ground. He made this voyage from Paris to near Rouen, on September 15, 1804, and was 5¾ hours in the air, ascending 6,977 metres, or 23,400 feet, without any inconvenience but from the dryness of the air. Even there he saw clouds considerably above him.

In August, 1807, Garnerin past 7½ hours of the night in the air, and at 18,000 feet of elevation, in an illuminated balloon, without any personal inconvenience or remarkable phenomena. He saw the sun rise, and in darkness saw near him little meteors. In a second night ascent, in a gale of wind, he was carried above 260 miles in 7½ hours. In another night excursion, Madame Blanchard was 20 hours in the air. Sadler passed 112 miles in 90 minutes.

In the atmosphere, heated air is constantly rising, and colder air rushes in to supply its place; which is the principal cause of winds: the air that flows from the poles towards the equator, in consequence of the rotation of the earth, having less motion than the atmosphere into which it passes, occasions an easterly current. The air passing from the equator towards the poles, having more motion, occasions a southern current. By these changes, the different parts of the atmosphere are mixed, cold is subdued by heat, moist air from the sea is mixed with dry air from the land, and the great mass of elastic fluid surrounding the globe, is preserved in a state fit for the purposes of vegetable and animal life.

In the Torrid zone, when mountains do not interfere, the winds follow the sun, and blow constantly in the open seas from east to west; the sun rarifies the air, travels westward, and the air constantly follows it. This tract extends about 25 or 30° on each side the equator.

Below latitnde 30° there is a general tendency of the wind to blow from the east and south-east. There is always an upper current blowing contrary to the Trade-winds. Westerly winds prevail from 30 to 40°. In hot climates, the wind sets from the sea to the land during the day, and the contrary by night. Rain seldom occurs in the constant Trade winds. In the Polar regions the winds are more irregular than in lower latitudes. Winds increase in force with elevation.

The constant current of the Trade-winds produces other winds to the north and south, tending to maintain the general equilibrium; and they are varied by the greater heat which arises from the reflection of land, and in particular of large extents of land; and also by mountains and by rain, and by the alternate heat and cold of seasons.

In the Indian ocean the Trade-winds are disturbed by the mountains, and large tracts of land presented by Africa and Asia; hence, in maintaining the equilibrium of the atmosphere, the wind, instead of blowing from east to west, takes opposite currents for six months, and at the times of change they produce tornados and storms by what are called the breaking up of *the Monsoons*, which is the name of the six months wind. To the south, from 10 to 23°, the wind blows constantly from the east and south-east, because the lands do not much interfere; but from 10° northward to the equator, north-west winds blow from October to April, and south-west from April to October; and north of the equator to the Tropic of Cancer south-west winds prevail from April to October, and north-east winds from October till April.

As the winds, over a breadth of 60 degrees, blow, with slight interruption, from east to west; so in the northern and southern hemispheres the atmospheric equilibrium demands that the prevailing winds should be from west to east, and therefore, for the most part, westerly winds prevail for two-thirds of the year, and they enable ships which sail to the West Indies by the Trade-winds to return to the East

by first ascending to the latitude of 40 or 45°.

The samiel is a hot noxious electrical wind, which sometimes passes over the sandy deserts of Arabia and Africa. It moves with the quickness of lightning, and passes in narrow currents for a few minutes. It occasions instant death to every man or beast who happens to face it, and it is said that it so decomposes them that their limbs fall asunder. The chance of it is indicated by a thick haze in the horizon, and travellers, if they have time, throw themselves on their faces with their feet towards it till it has passed. Hewlitt thinks that it was a samiel that destroyed the army of Sennacherib.

Wind is determined by the anemometer, by Lind, Daniel, and others, to move with velocity and force as under.

	miles per hour.	force in lbs. per sq. foot.
Gentle	4.5	0.079
Pleasant	8 0	0 260
Brisk Gale	16.0	1.107
High	36.0	5.208
Storm	62.0	15.625
Hurricane	88.0	31.25
Great Hurricane	120.0	58.0

If wind blows 100 miles per hour, that is, 528,000 feet, then, as air is 833 rarer than water, this, at 635 feet, or a furlong per hour, ought to be equal to it, which is absurd. There must, therefore, be some mistake. A West India hurricane has blown heavy cannon out of a battery, and water at five miles would scarcely bend a twig. Balloons have travelled 60 miles an hour, when the anemometer shewed but eight miles.

West India hurricanes begin in the north and end in the east, and they happen at a change of the moon.

The sirocco is a blighting hot wind, which prevails in Italy, &c. about April.

In Great Britain, westerly are to easterly winds as 223 to 140. The northwardly are to the southwardly as 192 to 173. And the north-east as to the south-east as 74 to 54.

At London, south-west winds blow 112 days; north-east 58; north-west 50; west 53; south-east 32; east 26; north 16; and south 18. The mean of Great Britain is 220 westerly, and 145 easterly. In the torrid zone, the winds are constantly east north-east on the north of the equator, and east south-east on the south side.

Capillary action is an effect or motion of parts of fluids when the elastic pressure of the air on the mass is *intercepted* by any intervening solid. Thus, in a barometer or pump bore, the pressure is taken off in the tube or bore, while it continues on the outer surface: if a solid be placed in water, the water rises round the solid, because the solid intercepts the pressure on its own side. If two solid plates are brought together, the water rises much higher, being pressed upon only through the sides. If the plates are closed at the side, as in the manner of a tube, the water rises in the tube in proportion as the bore, by its smallness, diminishes the downward pressure. If a solid of less specific gravity than mercury be immersed in mercury, the pressure acts more on the solid than the mercury, and occasions a depression. If water be placed under the receiver of an air-pump, it becomes vapour, or so much becomes vapour, as, by its elasticity, to sustain the remainder as vapour, and hence it will rise in a tube nearly as in the open air. These effects are important, because to them is owing the rise of moisture in the tubes of plants and all saturation. Viscidity varies the ascent, and also density, but, in general, the diameter of a tube multiplied by the height is a constant quantity. Experimenters find great varieties in the results which are occasioned by moisture, for the atmospheres of similar atoms or bodies combine, and thus, atoms of water in a tube facilitate ascent. Two plates, after immersion, sustain a curve of water, but if dry, scarcely any will rise between them.

It is this important principle of *intercepted* pressure which occasions a plumb line to incline towards a mountain, and boats to congregate about a ship, and small corks about a bung, but if the bung is *as dense as the water*, and floats below the water, the corks are not acted upon. From like cause, floating bodies are pressed towards the side of a vessel.

In a capillary tube, one-hundredth of an inch in diameter, different experimentalists have found water rises in such tube 2, 3, 4, and 5 inches, but this depends on the length of the tube, because the downward pressure from the top would be inversely as the length, from the fluid to the top. With a tube, one twenty-fifth of an inch diameter, Martin found that spring-water rose 1.2; vinegar 9.5; milk, 0.8; oil, 0.6; rum and brandy, 0.5; depending, of course, on the viscidness.

When a capillary tube is the 50th of an inch, *water* rises in it $2\frac{1}{2}$ inches; when the 100th, 5 inches; and when the 200th, 10 inches. When two plates of glass are placed at an angle in water it rises $2\frac{1}{2}$ inches, where the

plates are the 100th of an inch asunder, and 5 inches where the 200th, or half the heighth which it rises, where the pressure of the air is closed all round, as in a capillary tube. The rise in both cases being entirely owing to the *intercepted pressure* of the atmosphere by the glass, and depending on the angle which the top of the tube forms with the water, being less and less as the bore or angle is varied.

Water will not rise between cakes of wax or grease, and oil of turpentine rises but one-fourth, but spirits of wine rise two-fifths. Mercury sinks round glass or any substances lighter than istelf, and water sinks when the tubes are made of lighter substances; the experiment, in those eases, being reversed, or at right angles to the former.

Barometers are used to indicate the height of mountains, because the elasticity diminishes as the aerial space enlarges. The rule is as follows :—To subtract the logarithm of the number of inches at the top from the logarithm of the number of inches at the bottom, and the difference, multiplied by 60,000, gives the elevation in feet. Then, to correct this by the variation of the thermometer at the two stations, shift the decimal point three places to the left, and multiply by twice the sum of the degrees on the thermometer at top and bottom; add this to the first determination, and the sum will be the true elevation. For example, in the case of Snowdon, the barometer at bottom is 30.091, and at top, 26.439; the difference of their logarithms is 0.5614, which, multiplied by 60,000, gives 3668.4; to correct whieh, 3.37 × by 50.8 as above, = 171.2 + 3668.4 = 3589.6, the true height.

There is another rule, by the proportion of the sum of the two heights of the barometer to their difference, as 52,000 to the heighth: thus, in the case of Snowdon, as 56.53 is to 3 652, so is 52,000 to the height which is to be corrected for difference of heat, as before. The number 52,000 being a constant quantity in this ratio.

The variations in the barometer, from the expansion of heat, vary in this climate from the 10th to 20th of an inch. The variation depends upon the varied elasticity of the air. From 10 in the morning to 4 in the afternoon, between the tropics the barometer falls : it rises till 10 at night, falls till 4 in the morning, and rises again till 10 in the forenoon, in all about a 500th part of the entire elevation. There is much quackery in the words usually written on the plates of barometers, as the changes indicated depend on several circumstances, besides the elasticity of the air.

The surface of mercury in a barometer in rising is convex, because the friction of the central parts of the fluid mercury is less than the friction of the mercury at the sides next the glass; and, in falling, it is concave for the same reason, *i. e.* the increased friction between the glass and mercury detains the ring next to it. The local atmospheres, as between glass and mercury, are also concerned in this phenomenon.

If the atmosphere were of equal density, the rise of the barometer indicates a rise of 5.3 miles, but the rise of the barometer depends more on the elasticity than the density, and, therefore, is not a criterion of the height.

The greatest depression of the barometer in England has been to 28.1 inches.

Barometers rise and fall together, even at great distances. They fluctuate less at elevations above the sea. Northerly winds raise them, southerly winds sink them. Great falls and rises indicate an unduly increased and decreased temperature for the season.

Torricelli, a pupil of Galileo, having discovered that no principle of suction existed, and that water did not rise in a pump, owing to nature's abhorrence of a vacuum, imitated the action of a pump with mercury, and made the first barometer in 1643, and Descartes explained the phenomena. Suction was, however, defended all over Europe, and atoms were supposed to be provided with hooks, by which both suction and attraction were effected.

Corrections for barometrical differences are made by the simple ratio of the heights. Thus, if a table give 100 cubic inches at 30, and an observation is made at 29.2, the 100 would be in the ratio of the two heights.

It is the *elasticity* of the air which raises the mercury in the barometer, since it rises equally in any vessel closed against atmospheric pressure. In fact, the motion of the atoms which renders them gas, overcomes the weight, and the only thing measured by glasses, &c. is the *elasticity*. If weight had any effect on air, the atoms would not be in the lateral motion which causes their orbits, and the gaseous condition. This motion destroys or reduces the downward tendeney or weight as long as it is gas.—*Saumarez.*

There are four thermometrical scales in general use, by which mercury determines heat from its freezing point, at 40°, below zero, to 600°, where it boils.

No liquid can be used for a thermometer above 680°, and Fahrenheit

begins at 32° below the point of freezing water, for 0 or zero; and setting 32 at the freezing point, he ascends to 212, the heat of boiling water; taking 98 as blood-heat, and 176 as the heat at which alcohol boils; 55 as temperate, and 76 as summer heat.

A thermometer, for intense cold, is of alcohol.

Mercury expands between 32° and 212° about a 55th, or a ten thousandth of its bulk.

The mean of freezing and boiling is 110°, not 122°, because the expansion increases with temperature.

REAUMUR'S begins 10 degrees of Fahrenheit below Fahrenheit, and divides up to the freezing into 20 degrees. Then above, begins again; and his 20 corresponds with 77° of Fahrenheit, and his 40° with 122 of Fahrenheit, and his 80° with 212 of Fahrenheit; every $2\frac{1}{4}$ of Reaumur being 1 of Fahrenheit, taken from the freezing point.

As chemists and authors give the fundamental ratios of the gases, and even air and water, differently, and mystify themselves and their readers; and these vary, in consequence, even in the preceding articles; the Editor has endeavoured to reconcile discrepancies and verify his determinations.

He takes the cubic inch of water at 252.525 grains, of 7000 grains to the lb. avoirdupois; so that a cubic foot of water, of 1728 inches, weighs 436363 grains, or $62\frac{2363}{7000}$ lbs.

Then, as water is to air as 827.437 to 1, a cubic inch of air weighs 0.305168 grs.; or a cubic foot 526.3661, considered as 5 volumes, for 4 volumes of nitrogen and 1 of oxygen.

Oxygen is to air as 1.1111 to 1; therefore, 1 cubic inch weighs 0.3390947 grs. and a foot 585.9554.

Nitrogen is to air as 0 9722 to 1; therefore, 1 cubic inch weighs 0.296704 grs. and a foot 512.706.

Then 1-5th of 585 9554 = 117.1911; and 4-5ths of 512.706 = 410 1648, which, added, makes 527.3559 for the volume of a cubic foot of air.

Hydrogen is to air as 0 0694 to 1; therefore, the cubic inch is 0.02118, and the cubic foot 36 6 grains.

The French chemists call oxygen 1.10359, and nitrogen 0.96913, to air 1; but the English make them as above, and are probably more correct.

Water *freezes* by 32 of Fahrenheit, 0 of Reaumur, and 0 of the Centigrade, and it *boils* at 212 of F., 80 of R., and 100 of Centigrade; so that the distance is 180° of F., 80 of R., and 100 of C.

Thermometers vary from true heat; 51.26 deg. of true heat gives 50 of Reaumur, and 47.3 by alcohol; and 21.12 gives 20 by Reaumur, and 16.5 by alcohol.—*Biot.*

$\frac{3}{800}$, or the 266th, is the expansion of air and gases, for every degree of heat on the centigrade thermometer, instead of the 480th by Fahr.

Mercury, for thermometers, is purified by agitation in a bottle with sand, and then by straining it through leather. The thermometer was invented by Santorius and Drebel, in the 16th century. To convert degrees of Reaumur into Fahrenheit, multiply by 9, divide by 4, and add 32. But to convert Fahrenheit into Reaumur, subtract 32, multiply by 4, and divide by 9.

HYGROMETERS, RAIN-GUAGES, and ELECTROMETERS, are also used for atmospherical observations.

LIGHT AND COLOURS.

The ancients were familiar with the elementary principles of optics, and Euclid and Ptolemy developed them in formal treatises. They appear also to have been acquainted with the use of convex and concave glasses; but the former do not appear to have been applied to spectacles till the 13th century.

Roger Bacon, about 1250, described telescopes and microscopes exactly, and yet neither were made till the beginning of the 17th century, when one Metius, at Alkmaer, and Jansen, of Middleburgh, made them about the same time. Another Dutchman, of the name of Drebel, soon after made microscopes.

Galileo imitated their invention by its description, and made three in succession, one which magnified a thousand times; and having with these discovered Jupiter's moons, and the phases of Venus, telescopes soon became very popular, and were improved by Zucchi, Huygens, Gregory, and Newton; and, finally, by Martin, Hall, Dolland, and Herschel. The famous microscopes of Lewenhoeck consisted merely of small glass drops, or spheres. Prisms were first used in Italy, and their powers developed by Grimaldi. The theory of the rainbow was explained by Descartes; and the solar microscope was invented by Doctor Hooke.

Dr. Priestley's History of Light and Colours is the most amusing and instructive book ever written.

Mankind have always had theories of light and vision. The ancients thought we saw, in consequence of something passing from the eye to the object. Newton adopted the then prevailing theory, that light consisted of small atoms, moved with great velocity by some excitement, and reaching the

eye by reflection from surfaces. This theory is now doubted, owing to the difficulty of conceiving how such atoms could penetrate solid diaphanous bodies, or travel twelve millions of miles in a minute, through all obstacles. Huygens, Euler, and others, have imagined undulations of a peculiar medium. But all these hypotheses now yield to the electro-chemical theory, which identifies light with oxygen and hydrogen, finding it to be their constant accompaniment, and refers it to their peculiar mode of action called electrical. Its rapidity is ascribed to the protrusion of the atoms which fill space, and which are presumed to be suitably affected by such atomic excitements as usually, and in so many instances, produce heat and light. It is therefore considered as an effect, not as a peculiar entity.

The inconceivable condition that rays of light pass with a velocity of 200,000 miles per second, through solid diaphonous bodies, as glass, is removed by considering the effect as electrical. Glass is an electric, and the result, as in the spectrum, is in the very elements which are acting in all electricity. We may, then, consider light as an excitement, and the two results similar, and thereby clear philosophy from its demand on faith, that identical rays of light pass through glass, &c. We know that electricity permeates glass, &c. by its contrary action on both sides; and it seems to be a propagation by protrusion, from atom to atom, and therefore instantaneous. We get rid, too, of another difficulty, the rapid pace of light; since we may refer all flame to an electrical action of oxygen, hydrogen, and carbon, in all the circumstances in which light is produced. Non-electrics are dark bodies, and electrics are diaphanous; and those semi-opaque are rendered so by the admixture of dark non-electric substances.

All metallic oxides, especially those of mercury, lead, silver, and gold, become of a deeper colour by exposure to the sun's rays. Green precipitate, from a solution of iron, exposed to the rays of the sun, becomes blue, and words written with a colourless solution of nitrate of silver, become quite *black* when exposed for a few minutes to the light. Upon this is founded the *indelible ink* for marking linen.

Many salts will crystallize only when exposed to the light; and some bodies, if exposed to the light, combine with it, and will, under certain circumstances, emit it again.

Many flowers follow the sun's course, and plants reared in houses extend themselves towards the light. Plants that grow in the shade, or in darkness, are pale, and without colour: and, the more plants are exposed to the light, the more colour they acquire. Their taste and odour are derived from the same source; and the action of the sun's rays on the organs of vegetables, causes the emission of streams of pure air from the surfaces of their leaves.

Animals droop when deprived of the light, and it is essential to the health of man. Those parts of fish exposed to the light, as the back, fins, &c. are uniformly coloured; but the belly, which is deprived of light, is white in all. Worms, grubs, &c. that live in the earth, or in wood, have a whitish colour. Birds, and flying insects of the night, are likewise distinguishable from those of the day, by want of brilliancy of colour.

A ball of lime ignited, affords a very strong light, equal, in the focus of a mirror, to numerous argand lamps. Marble, at 750°, gives a brilliant white light. The most intense known light is that produced by galvanic poles, under an exhausted receiver, where nothing but their oxygen and hydrogen are present.

Light is also an effect of various excitements besides combustion. Friction produces it, and phosphori produce it; snow, diamond, the Bologna stone appear to absorb and radiate it; some combinations evolve it, and some plants give flashes. Rubbing the eyes in the dark, and their inflammation produce flashes of light. Slacking lime produces light and great heat.

Euler determined the direct light of the sun to be equal to 6500 candles, a foot distant; that of the moon, to one candle 7½ feet, or 300,000 times less. That of Jupiter, one at 1320 feet, and Venus, one at 421 feet.

The various discoveries of Huygens, in optics, were made about the year 1650; and he teaches, that light consists of undulations produced by luminous bodies on the fluid which fills all space. The same was the opinion of Euler, Dr. Young, and others. Descartes ascribed it to a protrusion from atom to atom, in the same universal fluid. Newton taught, that they were innumerable particles, flowing and travelling from the luminous body, with a velocity of a million of miles in five seconds!

The crystalline lens, in the HUMAN EYE, is composed of thin laminæ. At 25, the edges begin to be yellow, and at 80 the whole is like amber.

The optic nerve enters the eye .11 of an inch from the axis of the eye on the nasal side. The axis is .91. The pupil varies with light, from .13 to .27.

Focus of the cornea and chrystalline, .69. Angle of vision, taken in by the fixed eye, 110 degrees.

The diameter of a female crystalline, taken by Dr Brewster, .378; thickness .172, refractive power 1.384. Refractive vitreous humour 1.34, and aqueous 1.336.

The following are other dimensions of the parts of the human eye in inches:

Diameter from the cornea to the choroides	.95
Radius of the cornea	.335
Distance of the cornea from the first surface of the crystalline	.106
Radius of the first surface of the crystalline	.331
Radius of the back surface of the crystalline	.25
Thickness of the crystalline	.373

A good eye can see distinctly at the distance of six or seven inches.

The smallest visual angle is half a minute, and its size on the retina the 8000th of an inch.

If an object be more distant from either of two stations than 100,000 times the base, the angle at one station being 90°, that at the other will be 89° 59′ 57″ .9, the difference of which, and 90°, being but 2″ .1, is too small for sensible observation. Thus it is with the fixed stars and the earth's orbit.

The angle, subtended by the least visible object, (called the *minimum visibile*,) depends too on the colour of the object, the ground on which it is seen, and also upon the eye. Harris thinks the least angle for any object is about 40 seconds; and at a medium not less than two minutes. To most eyes, the nearest distance of distinct vision is about seven or eight inches. Taking eight inches for that distance, and two minutes for the least visible angle, a globular object of less than the three-hundredth part of an inch cannot be seen.

The variation of the pupil adjusts the eye to near and remote objects, and the most perfect vision is from those rays that pass nearest the axis of the pupil, and pass straight to the retina, without refraction.

Roemer proved the velocity of light to be 200,000 miles per second, by the accelerations and retardations of the eclipses of Jupiter's moons, as nearer or more remote in Jupiter's orbit.

Dr. Young's determinations about Waves of Light, proving decisively that light is undulations, and not travelling atoms, are the most valuable and curious discoveries of modern times. He not only solves all the phenomena, and establishes all the laws of optics, but measures the breadth of waves of different colours, and detects the interference of waves of other luminous bodies. In this respect, light partly resembles the waves of water, when excited by a falling body, and when waves of different falling bodies interfere, they neutralize, and augment one another, just like those of water. Beneath are the accurate determinations of Fraunhofer, who has pushed these enquiries to their limits of perfection. In France, Arago and Fresnel, and in England Brewster, acquire renown from the same pursuits.

Dr. Young, in 1802, promulgated the law, that wherever two portions of the same light arrive by different routes, either exactly, or nearly in the same direction, the light becomes most intense when the difference of the route is any multiple of a certain length; and least intense, in the intermediate state of the interfering portions: and this length is different, for light of different colours.

Fraunhofer has determined the breadth of waves of light to be as under, in parts of an inch:—

Red	.00002582
Orange	.00002319
Green	.00002073
Blue	.00001912
Indigo	.00001692
Violet	.00001572

The intermediate spaces are black, or, when the waves mingle, they are light. In various colours, therefore, no microscope can exhibit an object less than half those measures.

The smallest parts of bodies are transparent, and opacity is caused by multitudinous reflections, owing to atomic spaces or interstices, vacant or filled with water or gas.

Bodies are transparent, says Newton, when the pores are so small as to prevent reflection.

Light, in passing through bodies, does not increase their temperature, and adds only to temperature in opaque bodies, or in proportion to opacity.

A white object may be seen in different seas, at depths of 28, 36, 59, and 75 feet.

Water obstructs one-half the perpendicular rays of the sun in 17 feet, and one-fourth in 34 feet; and only a 100-thousandth part reaches the depth of 300 feet; hence the bottom of deep waters is in total darkness.

When the sea is a blue colour, it is deep water; and when green shallow.

If the quantity of light, when the sun is vertical, be taken at 750, at 75° it will be 742; at 60°, 718; at 45°, 666; at 25°, 507; and at 10°, 200.

Of 1,000 rays of incident light on *water* at an angle of 80°, 333 are reflected, and the remainder refracted;

at 60°, 65 reflected; at 40°, 22; and from 30 to 0°, 18.

In *mercury*, the reflection is 704 at 40°, and even 666 at 0°; double water at 80°.

Plate-glass at 80° reflects 412; at 60°, 112; at 40°, 34; and from 30 to 0°, 27 to 25. At 75° Lambert made the refracted and reflected light equal.

White paper reflects half at 45°, and water but 28 of 1,000, and glass but 42.

In *glass mirrors* 535 are reflected, and 465 absorbed or dispersed.

In *Herschel's* mirrors two-thirds were reflected at 90°.

Reflection is, in intensity, as difference of refractive power in the media.

Bodies which refract most reflect most, or are more splendid. The local atmosphere which increases one increases the other.

Only 45 of 100 rays reach the eye pure after two reflections by a telescope, and these by the eye-glass are reduced as 100 to 95, or to 42.

Refraction appears to be a variety of reflection, and a continuity of reflection from atoms to atoms in a medium called transparent. The light illumines the whole mass, but a principal ray prevails, and the law of the reflections is called the law of its refraction.

A plain mirror of half the length shows the whole body.

The sine of the angle of incidence being 1, the sines of the angles of refraction are in constant ratios, as under, in the following bodies:—

Sulph. of carbon is the highest known.

Chromate of lead	2.974
Diamond	2.755
Melted sulphur	2.148
Glass, three lead, one flint	2.028
Glass, two lead, one sand	1.987
Glass, two lead, one flint	1.83
Glass, one lead, one flint	1.787
Glass, three lead, four flint	1.732
Glass, one lead, two flint	1.724
Oil of cassia	1.641
Common flint glass	1.605
Quartz, ordinary ray	1.548
Quartz, extraordinary ray	1.558
Plate glass	1.542
Crown glass	1.534
Crown glass (common)	1.525
Oil of turpentine	1.476
Olive oil	1.47
Sulphuric acid	1.44
Alcohol	1.374
Ether	1.358
Salt-water	1.343
Crystalline humour	1.384
Water	1.336
Ice	1.31
Tabasheer	1.111
Air	1.000276

The refraction of gases, air being 1, is per Dulong, oxygen .924; hydrogen .47; nitrogen 1.02; carbonic acid 1.526; olefiant 2.302; chlorine 2.628.

Hydrogen or inflammable substances of equal density refract from two to seven times more than others. And taking the atmospheric refraction at unity, then the refraction of

Oxygen	Arago	0.8616
Hydrogen	Arago	6.61436
Do.	Berzelius	7.0335

The double refraction, or double picture of an object, which is presented through calcareous spar, is ascribed by Huygens to light passing through those bodies in a spheroidal form instead of circular, as in other solid transparent bodies.

All the light is reflected which falls on water at an angle of 48 degrees 28 minutes; and, at the angle of 53°, it is *polarized*. In common crown glass it is all reflected at 41° 49′; and polarized when reflected at 56° 45′; diamond, 68°; air, 46°; and rock crystal 57° 22′.

Polarized light is never derived from the light of combustion, or any artificial flame; only by reflection, by transmission through plates, or through crystals, which produce double refraction.

The test of polarized light is, that it refuses to be reflected by the surface of a transparent body when it is incident at an angle of 56°, and in two positions which are at right angles to each other, discovered by turning the surface round the ray. The angle of incidence for water is 52° 45′.

According to Brewster, the index of refraction is the tangent of its angle of polarization.

Some diaphanous bodies divide the ray of light into two parts, one of which follows the law of ordinary refraction; and the other *a particular law*. Transparent carbonate of lime highly exerts this action. Ordinary refraction always bears a ratio to the angle of incidence; but the angle of extraordinary refraction depends on the direction of the ray to the axis of refraction, (a line coincident with the axis of crystallization in carbonate of lime.) When the ray has a perpendicular or parallel direction to this axis, there is no extraordinary refraction; but, when it is inclined, the refraction accords with the angle of inclination. Light, thus peculiarly refracted, has particular properties. When made to pass through a double rhomboid of refracting spar, with an axis parallel to that of the original crystal, it passes on without any division; but, if the second rhomboid be turned slowly, while the first remains stationary, each pencil begins to separate: and, on completing the eighth part of a revolution, they arrive at their furthest point of division; at the fourth part of a revolution, the

pencil, refracted in the ordinary way by the first crystal, is wholly refracted in the extraordinary way by the second; and that, refracted in the extraordinary way by the first, is ordinarily refracted by the second. The same phenomena occur at every quadrant of the turn. Light, which has acquired these properties, is called *polarized light.*

Polarization is not conferred solely by refraction. Malus discovered, that light reflected from various substances, at certain determinate angles for each, is endued with the same properties, which angle in glass is 35° 25′.

Polarized light is peculiarly affected by reflecting surfaces. When a second reflecting plane is placed parallel to the first, the ray is wholly reflected; but when perpendicular, the ray is entirely refracted. The intermediate degrees are characterized by intermediate quantities of absorption and reflection.

Polarization may also be conferred by ordinary refraction. Thus, in passing through glass, light is partially polarized; and if transmitted through a series of parallel glasses, part of the molecules which escape the operation of the first are retained by the second, and another portion by the third; so that, if the number be sufficient, at last a complete polarized ray is obtained.

Another modification of light is among recent discoveries. If a ray of polarized light be passed through a thin leaf of mica, or selenite, and then analyzed by a double rhomboid of refracting spar, it no longer passes single, but two images of different colours are produced, complimentary to each other, or which produce white light by their re-mixture. The ray which falls upon the mica penetrates entire to a small depth, without the axes of its particles any way deviating from their position; but at a certain depth, (different for the different coloured particles,) they begin to oscillate like a watch balance. These oscillations have the same limits, but vary in velocity. The violet particles turn swifter than the blue, which exceed the green, and so on to the red.—*Fresnel.*

The PRISM was first experimented upon by Grimaldi. In Newton's, the sine of incidence being 50°, the sines of the extreme rays were 77° and 78°, and it gave 7 colours.

It has, however, since appeared that the colours depend on the *size* of the hole; thus Drs. Young, Brewster, and others, find that a hole the 20th of an inch gives but four colours, red 16 parts, light green 23, blue 36, and violet 25 of 100 parts, with a stripe of yellow equal only to 1. Hence Newton's measure is incorrect. The dispersion is one degree.

The dispersive power and the proportion depends also on the substance of which the prism is made. In a prism of flint glass it is 0.48; of crown 0.33; but chromate of lead is .4; oil of cassia .139; fluor spar and crysolite but .322; water .335; and sulphuric acid 0.31.

As to proportions, the mean ray in crown glass divides the green and the blue. In flint glass the boundary is much nearer the red; but in rock crystal it is much nearer the violet; and in oil of cassia nearer than in flint glass.

The red is least turned aside, and the violet most, and these are called least and most refrangible. The *illuminating* power is greater between the yellow and the green. The violet approaches to blackness.

Light appears to be a constant consequence of combustion, or of the union of oxygen with excited hydrogen, under a vast variety of combinations with carbon and other matter.

White light is a compound of many degrees of excitement when passed through a prism, and thereby subjected to oblique refraction or reaction. These varied excitements are separated into an oblong figure, the lower or straightest end of which is red, with shades to orange; then with shades to yellow; then with shades to green; then with shades to blue; then to indigo; and then to violet and negation.

In the prismatic spectrum, violet rays indicate *heat*, as 1, green as 4, yellow as 8, and red as 16; beyond the red no peculiar action exists. Some philosophers ascribe the colours to this difference of intensity; and hence painters call blue cold, green soft, yellow rich, and red warm. Musicians have similar notions.

Herschel ascertained that the extreme heat of the spectrum was 1½ inch beyond the red end, but others say at the red end. Ritter and Wollaston found that the violet end, and beyond, blackened muriate of silver, and a little beyond, and when blackened at that end, it was restored at the red end. In violet, phosphorus emitted white fumes in the red, but was arrested in the violet. Morichini and Mrs. Somerville have magnetized needles in the violet rays. Dr. Wollaston added other facts, proving the deoxydating power of the violet end, and the oxydating in the red.

The polarized pencils of Iceland spar gave the same colours as other light, and the same black lines.

The intensity of light was in the red 2, in the orange 30, in the yellow and

green 100, in the blue 32, in the indigo 18, and violet 3.

The extraordinary experiments of Fraunhofer make the red and other rays of the prism, in seconds, from

	Red	Other cols.	Dispersion
Crown glass • • • • •	361 •	1336 =	1697
Flint ditto • • • • • •	437 •	1726 =	2163
Water • • • • • • • •	305 •	1398 =	1703
O. turpentine, no violet	625 •	2060 =	2685
Alcohol, ditto • • • •	395 •	1125 =	1520
Sulp. ether, ditto • •	380 •	1150 =	1530

He found five colours, but only four in the last bodies; but he discovered that the entire spectrum was crossed by black lines, of which he counted 590 from the extreme red to the violet.

Newton, in 1671, measured seven colours in the prismatic spectrum, $18\frac{1}{2}$ feet from the prism, and $10\frac{3}{4}$ inches long and $2\frac{5}{8}$ wide. He determined the red to be 45, the orange 27, the yellow 40, the green 60, the blue 60, the indigo 40, and violet 80, parts of 352: the hole admitting the light being one-third of an inch in diameter. The light consisted of an infinite number of circles or shades, but those tints were so discriminated by him. Grimaldi had previously described the same colours, and had discovered that the hole generates the same colours by passing near any bodies creating fringes within and without a shadow.

The *heating* power of the red rays in the spectrum to green is 55 to 26, and to violet 55 to 16; *i. e.* oxygen 55, nitrogen 26, hydrogen 16.

As to *chemical* effects, white muriate of silver is blackened most at the extremity of violet rays; and if a little blackened, the whiteness is restored just beyond the red rays. Phosphorus is kindled just beyond the red ray, and extinguished at the violet. Guaiacum is made green in the red rays, and yellow again in the violet. So many proofs of the oxydating power of the red rays and the de-oxydating of the violet.

Fraunhofer's red results, in 5 prisms of different substances, were 2503, and his five dispersions were 11,298, about 1 to $4\frac{1}{2}$; but, in flint and crown glass, the reds were 798 and the dispersions 3860, 1 to 4.837, nearly that of oxygen in atmospheric air. Violet was wanting in one. The 590 black lines appear to result from the diffusion of opaque bodies in the transparent substance.

Considering the prismatic spectrum as a mechanical decomposition of the elements in the atmosphere, we have as many grades of atomic power as colours, and the red and violet appear to be merely the extremes. The colours assumed by iron, in heating and cooling, appear to evince the reaction of these gradations of atomic power, and we have other facts of similar kinds. The divisions of the spectrum are perfectly chemical. The proportions in the Newtonian spectrum are red 45 + orange 27 = 72, which may be regarded as the oxygen end; the other colours are 288; that is, 1 to 4, the known proportions of oxygen to nitrogen. The blue and green exactly divide the spectrum inclusively, 180 each way, and exclusively 120 each. So in Young's spectrum we have red 16, blue and violet 61; then dividing the light green, 23, into fifths, and adding 4.6, we have 20.6 for oxygen, and 79.4 for hydrogen.

The varied effects of different prisms prove that our experiments merely display different reactions, for we cannot consider the results of a prism as evidence of original properties of light, unless all prisms gave the same results. We seem, therefore, not to be justified in inferring any properties in primitive light, from the accidents which it encounters in its relations to bodies, or in these experiments. One prism gives seven colours, others but five, and some four; the effect is, therefore, that of the prisms, and not evidence of any property of light. Prismatic experiments merely prove, that such accidents may happen to light as explains the colours of bodies, which have power on their surfaces of producing an accumulation of similar accidents.

Such is the power of colour upon matter, that one grain of blue vitriol, or carmine, tinges an entire gallon of water.

The colours of bodies depend on the size of their atoms, and the chemical character of the local atmospheres of their atoms and interstices. Black has small atoms, and absorbs light—white large, and reflects it. Reds are of oxygen character, according to Ellis; greens nitrogen, and violets hydrogen. Their minute parts decompose incident light, and absorb some and reflect others; an oxygen body, combining with hydrogen, and reflecting red, and the contrary with others; thus a hydrogen atmosphere absorbs red, &c. and reflects blue, indigo, &c. and a nitrogen absorbs red and violet, and reflects green or white, orange or blue.

The colours of bodies are produced on the same principle as the colours of their plates, and are owing to the thickness or thinness of the atoms, so that the sizes of the atoms may be inferred from their colours on Newton's data. To greens he assigns atoms the 15 millionth of an inch. To scarlets the 19 millionth. To oranges the 17 millionth. To yellow the 16 millionth.

Vegetable greens the 25 millionth. Blues and purples the 14 and 12 millionth. Sky blue the 2¾ millionth. Pure white, as silver, the 5 millionth. Other whites are from 15 to the 25 millionth. Black varies from ½ to 2 millionths of an inch. This theory of Newton seems to stand.

Delaval shews that colours are exhibited, not by reflected, but by transmitted light. By covering the further surface of coloured glass, and other transparent coloured media, with some substance perfectly opaque, he found that they reflected no colonr, but appeared perfectly black. He hence concludes, that, as the fibres of mineral and animal substances, cleared of heterogeneous matters, are found perfectly white, the rays of light are reflected from these white particles, through the covering coloured media, which serve to intercept and impede certain rays in their passage, yet leave a free passage to others, that exhibit, according to these circumstances, different colours. Delaval concludes, 1. That the colouring particles do not reflect any light. 2. That a medium, or local atmosphere, is diffused over the anterior and further surfaces of the plates, whereby objects are reflected equally and regularly, as in a mirror. 3. All the coloured liquors appear such only by transmitted light; and, 4. These liquors, spread thin upon a white ground, exhibited their respective colours; he therefore concludes, that all coloured bodies, not transparent, consist of a sub-stratum of some white substance, thinly covered with the colouring particles.

Very thin plates of transparent bodies become coloured, and the thinnest black, so as to reflect no light; while, according to thickness, the various colours are produced. When convex lenses are used to produce these thin plates, by laying them on each other, coloured rays are prodnced. The colours produced by reflection and transmission, taken from the centre, are as under, in perpendicular rays.

1. Black • • • • • • White
2. Blue • • • • • • Yellow
3. White • • • • • Black
4. Yellow • • • • • Violet
5. Red • • • • • • • Blue
6. Violet • • • • • • White
7. Blue • • • • • • Yellow
8. Green • • • • • • Red

and so through seven series.

The thickness of 1 was the millionth of an inch, and in water ¾ths; and of 2, 2⅜, and in water 1½; and for No. 7 15½ millionth, and 11½. They appear to be explained by the determinations of Dr. Young and M. Fraunhofer, and to arise from the extent of waves. Newton, in his characteristic way, ascribed them to fits of easy reflection and transmission.

The smallest atoms are black, or too small to reflect light, and this is the case when they are less than the eight millionth part of an inch.

Air, at less than half-a-millionth of an inch thick, ceases to reflect light; water at three-eignths, and glass at one-third. At 72 millionths air reflects white, water at 58 millionths, and glass at 50 millionths, according to Newton.

The film of a coloured soap-bubble, about to burst, is only about three-fourths of the millionth of an inch in thickness.

In general, less thickness is necessary to reflect the most refrangible rays, as violet and indigo, than those least refrangible, as red aud orange.

Transformations of visual colours:

A square of red, long viewed, prodnces a light green border, and afterwards a square of light green—

White produces black, and black white

Red, blue • • • • • • • • purple, green

Blue, yellow • • • • • • green, red

A wheel, painted in prismatic proportion, requires 80 deg. violet, 40 deg. indigo, 60 deg. blue, 60 deg. green, 48 deg. yellow, 27 deg. orange, 45 deg. red; and if any colour is taken out, and the wheel turned, the remaining colour is a transformed colour as above. It is ascribed to the subsequent sensibility of the nerves first affected, by which they, as it were, take no cognizance of the same colour, when mixed with others. It is altogether a curious subject, and ably discussed by Dr. Brewster. In general, the new colour is removed half way in the spectrum, as though there were two spectra, one beginning at the middle of the other.

The theory of the rainbow was accurately developed by Kepler and Descartes in diagrams, just snch as now appear in books. Father Grimaldi had ascertained the powers of the prism, and published a book relative to its peculiar phenomena; and Newton, in repeating these experiments, made several valuable inferences, and pursued the subject so as to confer on optics the character of a science.

The inner rainbow has an angle of 41 deg. from the centre of the solar axis, and is 1 deg. 46 min. from *violet* to *red*; the outer bow is 52 deg. and 3 deg. 12 min. wide from *red* to *violet*. Or, the outer rainbow is 52 deg. to 55 deg. and the inner 40 deg. to 42.5 deg. the colours in the twn being reversed.

Halos are occasioned by crystals of

ice in the atmosphere, or small hail-drops partly melted.

Halos are about 23 and a half degrees in diameter, or exactly double.

Looming high, mirage, fata morgana, &c. arise from the air at different heights being of unequal refraction, by which rays from distant objects are bent downwards to the eye of the spectator, so that objects below the visual horizon, or 17 miles at sea, are seen above it. A hot poker will display the same effect; or, by looking at objects through liquids of different refractive powers in a glass vessel.

A difference of temperature of 3.6° in two places, creates irregular refractions between them.

The horizontal moon and sun surprise by their apparent magnitude, but all magnitudes are increased in the horizon; the first 5 degrees is apparently to the eye equal to 10 or 15 at 50 or 60 degrees of elevation, and the first 15 degrees fills a space to the eye, equal to a third of the quadrant. This is evidently owing to *the habit of sight*, for, with an accurate instrument, the measure of 5 degrees near the horizon is equal to 5 degrees in the zenith, and if the angle of the sun or moon be taken, either with a tube or a micrometer, when they appear to the eye so large in the horizon, the measure is identical when they are in the meridian, and appear to the eye and mind to be but half the size. There are two causes for this mistake, one, that we infer distance from intervening objects, and also size from brightness; and the angle being the same, and the brightness less, the mind treats it as an object farther off, but of a given size, and therefore sees it larger.

Mr. E. Walker maintains, that the magnitude of the horizontal moon arises from the enlargement of the pupil of the eye, as the day declines. He ascribes the enlargement of objects in a mist to the same cause, and says, the pupil is sometimes 30 times larger than at other times; and on this depends the visual size on the retina.

The cause of the luminosity of the sea, so intense in tropical climates, is still an unsolved difficulty. No insects can be traced in the water, and it shines only when disturbed, as by the track of a vessel, or the breaking of waves. Humboldt, and others, have studied it without result. Persons bathing in it are covered as with liquid fire.

Late experiments of Mr. Ellis prove, that the green colour of plants arises from their nitrogen character, that red colours arise from oxygen, and indigo and violet from hydrogen.

The *Galilean* telescope has a concave eye-glass, and is clearer and shorter than those of Kepler, with Huygens' three convex eye-glasses to set the figure upright.

The *Gregorian* reflector has a small concave speculum for the image, and a large one facing for the object, with an aperture in the middle.

The *Cassigrain* has a small convex speculum instead of the small concave. In Newton's plan, the small speculum was plane at 45 deg. and the eye-piece in the side; but Gregory's and the Cassigrain are preferred.

Herschel's 40-foot is in Newton's form, with a tube of sheet-iron. The eye-glasses, with which it magnifies 6400 times, are one-fiftieth of an inch focus. His discoveries were, however, made with five feet achromatics, and his great telescope was a toy: the mirror would not keep its figure.

Dr. Brewster has suggested a great improvement, by receiving the image through an achromatic prism, and so refracting it to the eye-piece, while it greatly increases the light.

The speculums of reflecting telescopes are 32 copper, 15 grain tin, 1 arsenic, 1 brass, and 1 silver.

The magnifying power of a telescope is the quotient of the focal length of the object-glass, by the eye-glass, or one of the eye-glasses.

In Herschel's 40-foot reflector, the great speculum was 48 inches diameter, 3½ inches thick, and 2118 lbs. weight, and it magnified 6400 times.

In 1821, a 25-feet reflector, on the direct principle, was set up at Greenwich, by Ramage, of Aberdeen.

The relative aberration of glasses, from a spherical figure, is in a plane convex 4½ times its thickness. A convex lens, whose sides are 1 and 6, is 1.08 its thickness. An equal double lens is 1.57 its thickness.

The best form of a *lens* is a double convex, whose radii are 1 and 6. The 1 being towards parallel rays, the aberration is but 1.07, but the 6 towards them makes it 3.45.

Spherical aberration is avoided by a lens, part of an ellipsoid, whose greater axis is the index of refraction, and the distance of the foci 1. The second surface being concave, whose centre is the other focus of the same spheroid. Also, if one surface is plane, and the other part of an hyperboloid, whose greater axis is the index of refraction, and the distance of the foci 1.

The surface of a true concave mirror is a paraboloid. In reflecting-telescopes the mirror is an ellipsoid.

The tube of Herschel's grand telescope was 39 feet 4 inches long, and

4 feet 10 inches diameter; made of iron. The concave polished surface of the great mirror was 48 inches in diameter, its thickness 3 and a half inches, and its weight upwards of 2000 lbs. This noble instrument was begun in 1785, and completed Aug. 28, 1789, on which day he discovered the sixth satellite of Saturn.

Dr. Priestley says, the easiest method to find the magnifying power of any telescope is to observe the distance you can read a book with the naked eye; removing it to the farthest distance at which you can distinctly read it by the telescope; and the greater distance, divided by the less, gives the power of the telescope.

In *achromatic* telescopes, the colours of refraction, through any single glass, are corrected by combining glass lenses of different dispersive powers, as crown glass and flint glass. They were first made by More Hall, about 1723, and for sale by Dolland in 1757. The object-glass is composed of two convex lenses of crown glass, and one concave of flint glass; or sometimes of one of each. The curvature, to be multiplied by the focal length of the whole, should be as follows:—

1st lens, convex crown 0.6087 . . . 0.8696
2d lens, concave flint 0.4544 . . . 0.6087
3d lens, convex crown 0.6087 . . 0.6087

With two glasses—

1st lens, convex crown . . 0.293 . . 0.353
2d lens, concave flint . . 0.345 . . 1.148

or, for 30 inches, 8 inches and 14.3 for the first; and 12.11 and 28.5 for the second lens, taking the specific gravity of the flint glass at 3.354, and the ratio of refraction in the two, as 1 to 1.656. In eye-glasses, the concave should be crown and the convex flint; the first 0.64, the second 0.529; and the third 0.64, multiplied by the focal length: and, in double eye-glasses, 0.32 and 0.529.

Polarization seems to be a result of the interference of waves, and of the novel forms of waves after incidence; and further attention will demonstrate this as a necessary consequence of reflected waves.

The microscope enables us to detect animalculæ the 10,000th of an inch long; and if half as broad and thick, a cubic inch would contain $10,000 \times 20,000 = 4$ millions of millions, yet moving and perfect.

The highest lenses of Lewenhoeck's microscopes were but the 20th of an inch. They magnified the diameter 100 times, and the surface 10,000 times. The 59th of an inch magnifies the same 500 and 250,000. An inch focus magnifies but 5 and 25, and a half inch 10 and 100.

The microscope detects globules with important functions in the blood, the chyme, the chyle, the lymph, the milk, the pus, &c. It also displays globules equally active in vegetable organs. Animation appears to begin with a globule, called the *monas termo*, a transparent point visible with the microscope, and found among infusoro.

A convex lens is simply a multiplying glass with an infinite number of sides, and hence its power of enlarging the angle in a blended figure, magnifying and forming a focus. A plain piece of glass affords but 1 image, but a prism gives 2, a hexigon 6. The images are as the number of sides, and each, taken separately, is without enlargement; but coloured and distorted, owing to the inclination of the sides to the light. But when the sides are increased to a regular circle, or curve, the images become infinite in number, and, mingling together, are seen in *one* expanded image, under the whole angle from right to left, upward, downward, and oblique; and therefore, in every part, are by all the sides produced in one blended image, enlarged and magnified. Then, as all the images are seen from one point, that becomes the focus; distortion is neutralized by both sides, but colour is generated by the inclinations and the varying refractions of different rays, falling at different angles.—*Editor*.

One of the most curious speculations is that of concentrating, or multiplying the heat of the sun, by plain mirrors, concave mirrors, or convex lenses. As one plain mirror reflects the heat of the sun, so the reflection of two, three, or more augments the heat. In this way, Archimedes burnt the Roman fleet at Syracuse; and Antheonius, an architect at Constantinople, described the method, and so does Leonard Digges, who wrote on it in the reign of Elizabeth, and asserts that he fired bodies half a mile distant.

Buffon combined plane glass-mirrors only 6 inches by 8; and with 40, set on fire a tarred beech plank 66 feet distant. With 98 at 126 feet; with 112 at 138 feet; with 154 at 150 feet; with 168 at 200 feet; and he melted all the metals at 30 or 40 feet.

Concave burning mirrors have been made of great size and power. They concentrate the sun's image at half the focal length. One of four feet diameter, made of copper and tin, melted iron ore in 24 seconds, a sixpence in 7½ seconds, a halfpenny in 20 seconds, tin in 3 seconds, cast iron in 16 seconds, and slate in 3 seconds. Water boils immediately and evaporates, wood flames in a moment, pummice-stone becomes glass, earth yellow or green glass.

Concave wood or pasteboard, gilt and polished, makes as good a focus as metal.

Parker made a glass lens 3 feet in diameter, with 6 feet 8 inches focus, and 3½ inches thick at the centre. It fused slate in 2 seconds, pare gold, platina, nickel, and cast iron in 3 seconds, pare silver in 4 seconds, pebble, barytes, and lava in 7 seconds, steel and bar iron in 12 seconds, limestone in 55 seconds, volcanic clay, Cornish moor-stone, and rhomboidal spar in a minute.

Gold retained its metallic state though exposed for hours. Wedgwood's pyrometrical clay ran into white enamel in a few seconds. The lunar rays gave no heat.

The rays were concentrated about 4000 times, if the focus was the quarter of an inch in diameter.

As minute bodies make coloured rings, which increase inversely as the bodies, Dr. Young contrived an *Eriometer*, to measure such bodies and small fibres. He thus determined, that the seed of lycopodium is the 10,500 of an inch, or 3.5 on his scale, every part of which is the 3000th of an inch. The atoms of milk were 3, or the 9000th of an inch; of human blood 7; of fibres of silk 12; of cotton 19; of Saxony wool 22; of South Down 25 to 30; coarse wool 60.

Fraunhofer, in his optical experiments, made a machine in which he could draw 32,900 lines in an inch breadth. There are 7700 veins in an inch of coloured mother-of-pearl. Iris ornaments, of all colours, are made by lines on steel, from 2000 to the 10,000th part of an inch.

Impressions on the eye are permanently continuous, which are repeated seven times in a second, and on this is founded the rotatory toy called the Thaumatrope.

The Photometer determines the quantity of sun-shine, at noon, to be from 90° to 100° at midsummer, and in midwinter 25° to 28°. A northern aspect at noon, in summer, is from 30° to 40°; and in winter from 10° to 15°. In gloomy summer weather it is from 10° to 15°, and in winter only 1°.

Mirrors are silvered by mercury, heated with half the weight of tin.

Aberration of light is said to arise from the motion of the earth in its orbit, while the light is passing from the sun; so that the apparent place is slightly different from the calculated one. The earth resembles a bird in its flight, and the light a stone thrown at it; and a good marksman, in taking aim, makes allowance for the flight, during the progress of the stone, and aims a little a-head. It is 20″.232.

SOUND AND MUSIC.

Sound arises from vibrations of the air, as may be *seen* by the vibrations in the water of a musical glass, and by the affections of light bodies, laid on strings in concord; and they may be *felt* by the vibrations of all instruments.

The delicacy and intensity with which they reach the ear, proves the extreme fullness of space in aerial atoms. We distinguish tones when the vibrations are 7000 in a second, and therefore the particles must be less than the 56,000th of an inch asunder, considering the gravest tone as the 8th of an inch. This coincides too with waves of light, which appear in red, to be the 40,000th of an inch asunder, and in violet the 64,000th.

In air, sound travels from 1130 to 1142 feet per second.

In water, sound passes at the rate of 4708 feet per second.

Sound travels, in air, about 900 feet for every pulsation of a healthy person, at 75 in a minute.

A bell, sounded under water, may be heard under water at 1200 feet distance.

Sounds are distinct at twice the distance on water that they are on land.

The lowest tone which the ear can discriminate, is, according to some, 12½ undulations in a second, and to others, 30; and the most acute, above 6000.

The average limits of sound are 32 vibrations per second, as the gravest, or 8192 per second as the acutest; but some ears are more sensible. The *harmonics* of one sound are the separate effects of different parts of the string.

The progress of sound is usually taken, in mean temperature, at 1130 feet per second; but Parry's experiments at 17° 27′ F. was 1035° 19′, and of Franklin's at 9° 14′ F. was 1069° 28′.

The velocity of waves of sound, in an elastic medium, is equal to the velocity of a body falling through the half atmosphere, or heights of the modulus of elasticity, or half 27,800 feet.

The fire of the English, on landing in Egypt, was distinctly heard 130 miles on the sea.

Dr. Jamieson says, in calm weather he heard every word of a sermon at the distance of two miles.

Sounds are more intense as the air is denser.

In the Arctic regions, persons can converse at more than a mile distant, when the thermometer is below zero.

The report of a distant gun is heard before the word fire, which directs the discharge.

Water is a better conductor of sound than air. Wood also is a powerful conductor of sound, and so is flannel or ribbon.

The sound of a bell dies away as the exhaustion by an air-pump proceeds; but sound continues, since the exhaustion cannot be perfect.

A bell not only does not sound in an exhausted receiver, but if in a receiver not exhausted and covered by another, and the intervening space exhausted, that void space will not conduct the sound.

Sound affects particles of dust in a sun-beam; cobwebs, and water in musical glasses; it shakes small pieces of paper off a string in concord. Deaf persons may converse through deal rods held between the teeth, or held to their throat or breast.

A bell does not in water produce a tone, but a short noise, like two knives struck together. The agitation of the water produces no change. In the water, a large bell is heard 45,000 feet; but in the air, out of the water, but 656 feet.

In sound, as in light, the angle of incidence is equal to the angle of reflection. The laws of catoptrics apply to sound.

• Echoes are distinguished, when the time between delivering a sound, to its return, is more than one-twelfth of a second; and as the sound goes and returns, so, to the speaker, there can be no echo in less than $\frac{1130}{24}$, or 47 feet; and syllables cannot be repeated in less than one-seventh of a second more, or 161 feet for each syllable.

Echoes are formed by elliptical surfaces, combined by surrounding surfaces, or by such of them as fall into the respective distances of the surface of an ellipse, and are therefore directed to the other focus of the ellipse. For all the distances from both foci to such surface are equal, and hence there is a concentration of sounds at those points, direct from one focus, and reflected back again from the other focus.

An echo returns a monosyllable at 70 feet distance, and another syllable at every 40 feet additional.—*Gardiner.*

The echo of artillery is increased or created by a cloud or clouds.

Every sound is a mixture of 3 tones, just as a ray of light is of 3 colours. The union of the key-note with the 5th and 10th, is the common chord. The diatonic scale is the prism of sound.

The close analogy of the diatonic and prismatic scales, and the fact that different tones are heard simultaneously, lead Sir R. Phillips to infer that sound and light, or tones and colours, are produced by two different affections of the very same medium. White light may be decomposed into three colours, and every sound is a compound of three tones. Atoms of oxygen and nitrogen, in conjunction, may produce one, oxygen another, and nitrogen a third, both in light and in sound. One is the excitement of propulsion of atoms, called light, and the other the propulsion of a gross volume, called sound. Every propulsion of the aerial elements, called light, includes, in analysis, the prismatic scale, and every vibration in the same elements, in analysis, produces the diatonic scale. Both scales, too, are chemical, and are produced by the very atoms which produce all our chemical and electrical phenomena. The scales, too, are similar, because they are the measures of the effects on the same sensorium. The figures agree, since a volume of five parts of atmospheric air is four measures of nitrogen and one oxygen, and every sound is composed of the fundamental note, its fifth and tenth, whose square, or force, is 25 and 100, or 1 to 4. In the spectrum, Young determines the red to be 16, yellow 1, and light blue 23, blue 36, and violet 25, in 100; which, for red only, would be about 20 to 100, and for the rest, 80 to 100; *i. e.* 1 to 4, the exact proportions of oxygen and nitrogen in volume, or 20 and 80 to 100 by weight, and also of tones in a sound.

Sounds in liquids and solids are more efficient and more rapid than in air. Two stones, rubbed in water, may be heard in water at half a mile. Cast-iron conducts sound with ten and a half times the velocity of air. A string, or piece of deal, held to the ear, or between the teeth, gives a vast increase of effect. And pipes convey sounds to vast distances.

Sound is lost in passing from one medium to another, and hence, as we produce sounds by vibrating solids, the effect in air is less.

The sense of hearing arises from an expansion of nerves into the inner chamber of the ear, and these receive the vibrations of the tympanum, a strained membrane. This elastic membrane is *damped* by a small bone, called the *mallet*, but, like a drum, it will not transmit to the brain two loud sounds in immediate succession.

The notes of the musical scale are formed by the contraction or enlargement of the *rima glottidis*, an aperture in the larynx over the windpipe. It is like the reed in wind instruments, but

susceptible of the most delicate variations.

The point of action in the voice is in the throat, and level with the hair in the back of the neck. As singers raise or lower this point, the tone is harsh, hard, thick, throaty, and guttural.—*Gardiner.*

High notes are produced by lessening the aperture, and increasing the velocity of the breath. If the lowest notes would permit the passage of a billiard ball, the highest should permit but a pea.—*Ibid.*

The Gamut is so called from *gamma*, the third letter of the Greek alphabet, used by Guido for his lowest note. It consists of 20 notes, two octaves, and a major sixth. The first expressed by capitals, the second by small letters, and the rest by double small letters, as G, A, B, &c. g, a, b, &c. and g g, a a, &c. It is now extended to an entire scale of five or six octaves.

Counter-point, or melody with harmony, as treble and base, was invented by Guido, about 1022; and the time-table by Frameo, in 1080.

The modern system gives 24 notes to the octave.

B sharp	F sharp
C natural	G flat
C sharp	F double sharp
D flat	G natural
C double sharp	G sharp
D natural	A flat
D sharp	A natural
E flat	B double flat
E natural	A sharp
F flat	B flat
E sharp	B natural
F natural	C flat

These can be performed only with the voice or stringed-instruments, and not by ordinary keyed-instruments.

The common scale has 12 notes, and includes 3 sharps and 2 flats; but exact intervals demand 6 other sharps and 6 other flats in a perfectly-divided octave. *Smith.*

C to D, D to E, F to G, G to A, and A to B, are tones. E to F and B to C are semitones. The strings are 1 for C, $\frac{8}{9}$ths for D, $\frac{4}{5}$ths for E, $\frac{3}{4}$ths for F, $\frac{2}{3}$rds for G, $\frac{3}{5}$ths for A, $\frac{8}{15}$ths for B, and $\frac{1}{2}$ for C.

When a string is vibrated, the ear discriminates the principal sound and its octave, and also two high sounds, one a twelfth, or octave, to the fifth, or two-thirds the string, and the other the 17th major, or double octave of its third major, or four-fifths of the string. So that we get (1) the sound of the whole string, (2) of half the string, (3) of $\frac{1}{2}$ of $\frac{2}{3} = \frac{1}{3}$, and (4) $\frac{1}{4}$ of $\frac{4}{5}$ths or $\frac{1}{5}$th. That is, $1 + \frac{1}{2} + \frac{1}{3} + \frac{1}{5}$, or $1 + \frac{15}{30} + \frac{10}{30} +$ and $+ \frac{6}{30}$, or $1 + 1\frac{1}{03}$th. This is the result of the *sum* of all the vibrations of all the parts of the string; for the centre has one vibration, and the sides, from the centre to the fixed points at both ends, have their own vibrations, which on both sides are doubled.

The unison octave is the major fifth, and major and minor thirds, and the major and minor sixths are concords; the three first are perfect, and the two last imperfect. Common chords are a key-note, with its third and fifth, and major or minor just as the third is major or minor.

There are four or five clefs or keys. The G, or *treble* key, on the second line. The F, or *bass* key, on the fourth line. The C, or *tenor* clef, on the fourth line. The *counter-tenor* clef on the third line. And the *soprano* clef on the first line.

In the Fifteenth Century, there were only those of F and D *minor*. The key is the base or centre of any system of notes, and gives character to the composition. Old English songs were in G *minor*.

A third note, made by two whole tones, is called a *major* third; but if made by a tone and semitone, it is a *minor* third.

The perfect fifth consists of a major third and minor third, or two major tones, one minor, and a semitone. That from D to A is 1 major, 2 minor, and 1 semitone, and is flatter than the true fifth.

On account of the imperfection of instruments with 12 or even 24 notes, the tuner adopts a temperament by taking the fifths too flat; by which the errors are masked or compensated in ascending and descending.

In tuning by fifths, from C to G, and G to d, and from d to D, C D is a *major* interval. But, tuning A as fifth to D, and e as fifth to A, then E downward, as octave to e, would be major to D, and the intervals C E by two *major* tones, and E much too sharp. If, however, E be tuned as major third to C, the interval D E is less than the former D E, and therefore the *minor* tone. Then the difference between the first and second D E is THE COMMA.

The exact natural divisions are not tones and semitones, for the longer intervals of semitones are greater than half. C to D is therefore called a tone major, D to E a tone *minor*, E to F a semitone, F to G tone *major*, G to A tone *minor*, A to B tone major, and B to C semitone; that is, three major tones, two minors, and two diatonic semitones.

Three chords, the *tonic*, or key-note, third and fifth, the *dominant*, the second and seventh, and the *subdominant*, the fourth and sixth, are the radical

parts of every scale, minor and majnr; and all melodies have the perfect concords of these keys for their fundamental bases.—*Callcott.*

The Liston, or enharmonio system, adds 29 notes to the 24, making 53; and an organ has been set up at Calcutta with 39 notes in the octave.

The lengths of string and the vibrations per second for the eight possible octaves, are as under:—

	Length.	Vibrations.
Ledger below	80000	30
	40000	60
	20000	120
	10000	240
C staff	5000	480
Ledger above	2500	960
	1250	1920
	625	3840
	312.5	7680

The lowest note of 30 vibratinns wonld, therefore, be expressed by a string eight times the length of the lowest nnte of the C scale on the stuff; and the highest note of the highest octave by a string but one 16th of the string which expresses the highest note of the nctave C on the stuff. Of course, as twice 7680 vibrations is 15,360 vibrations, and this is above the power of the ear, so above 7680 would be merely a piercing shriek, and not music.

Fewer than 30 vibrations in a *second* give no sound, and when the vibrations exceed 7520 in a second, the tones cease to be discriminated.

According to the accurate calculatinns of Farey, the following are the length of the strings, andthe number of vibrations of each in a second of time, in the octave of eight notes, three sharps, and two flats:—

	length.	vibra.
C natural	5000	480
B natural	5297	453
B flat	5612	428
A natural	5946	404
G sharp	6300	381
G natural	6674	360
F sharp	7071	339
F natural	7491	320
E natural	7937	302
E flat	8409	285
D natural	8909	269
C sharp	9439	254
c, lower octave	10000	240

The artificial commas begin at 612, and diminish to 0, nr 51 on each note.

Enler makes A 6000, F 7500, and E 8000; and the commas of those notes 451, 254, and 197.

Below 30 vibratinns in a second, there is no sound; but tones may, it is said, be discriminated up to 14,000 vibrations per second. Hence, as a string in C gives 480 vibrations, sound is capable of expressing 9 octaves between 30 vibrations, 3 lower than the staff, and 4 abnve it, up to 7680 vibrations per second.

The laws of aerial vibrations are indicated by the laws of musical sounds, which are immediately connected with their powers, and coincident with them.

Adagio is slow time; ***andante***, middle time; ***allegro***, quick time. In adagio, the crotchet accords with a pulsation; in andante, the quaver with the trotting of a horse. Allegro is double-adagio.—*Gardiner.*

Thorough bass is the art of expressing, by musical characters, the harmonic combination of notes, which are to be struck with the right-hand upon the piano-forte, in accordance with any given note in the bass, which is struck with the left-hand.—*Gardiner.*

Melody belongs to the imagination, and not to science; it is the gift of rnde invention, and, like feeling and sentiment, belongs to nature. But harmony is a work of art, and, in combining simultaneous sounds, the intellectual enjoyment of a succession of proper chords, only to be felt by the instructed.

Modulation is an effect of the principal key, to which the melody returns after any transitions, and in which it concludes.

The cadence, or conclusion nf every composition, is a change in the harmony, from the dominent to the tonic, or the tonic to the dominent. It is a progression from the harmony of the fifth of the key to the key itself, and is called the perfect cadence.—*Callcott.*

Melody is the system of sounds, which follow each other at diatonic distances, or intervals; and when they do not so follow, sounds are mere noise.

When F is made the key or base of any melody, the effect is rich and grave; but its relative, D minor, is more sombre.

C is bold and energetic; and its relative, A minor, is similar, but plaintive.

G is gay and lively; but its relative, E minor, soft and tender

D is grand and lofty; but its relative, B minor, complaining.

A is glowing; but F *sharp*, minor, mournful.

The *sharps* of E are brilliant and sparkling.

The *sharps* of B are piercing.

B *flat* is dull, and G minor melancholy.

E *flat* is mellow and soft, and C minor complaining.

A *flat*, delicate and tender; but its relative, F minor, gloomy.

D flat major is solemn and awful.

Pythagoras is said to have invented harmonic strings, in consequence of hearing four blacksmiths working with hammers in harmony, whose weights he found to be 6, 8, 9, and 12; or rather, by squares, as 36, 64, 81, and 144.

The lyre of the Greeks was the harp of the moderns; and the viol and vielle of the middle ages is the modern violin.

Pindar, in Greece, afterwards called the lyre the seven-tongued lyre. Pythagoras added an eighth string.—*Burney*.

The lyre is ascribed to Thoth, and had but three strings. The flute, or photinx, is also of Egyptian origin.—*Burney*.

The ancients adopted three strings in their lyre, because every tone on one string is three tones; and then the three strings were of such lengths, that two of them perfected the two concealed or faint tones of the principal string. Then, as the two generated four concealed tones, so other four strings perfected these four tones, making seven strings. The octave string was added, as a sort of harmonic result to the seventh, and served to join the tones of the first and eighth in unison.

Greek instruments had no neck for shortening the strings.—*Montfauçon*.

An harp of the eleventh century is preserved in Trinity College, Dublin.

A lyre was found in a tomb at Athens, like that of Apollo, with eight strings.

The bag-pipe, a Celtic musical instrument, much used in the Highlands and Ireland, is composed of a leathern bag; connected is a pipe or chanter, with a reed, and the passage of the air from the bag produces the tones. These are all drones, two in unison with D on the chanter, and a long drone an octave lower.

The organ was invented by one Ctesibius, a barber of Alexandria, about 100 B. C.

Church organs are in two parts, the main, and the little organ before the other. The largest pipe expresses the size, as 8, 16, or 32 feet organs. That at Ulm is 93 feet high, and 28 broad; its largest pipes, 13 inches bore, with 16 pair of bellows.

The organ at Haerlem is 108 feet high, and 50 feet broad; with 5000 pipes, resembling columns of silver, from the ground to the roof. It produces a tone of thunder.

The organ in the new church at Amsterdam has 52 whole stops, besides half-stops, and two rows of keys for the feet, and three for the hands; and a set of pipes that imitate a chorus of human voices.

The famous Temple organ, in London, was erected by competition of Schmidt and Harris, two famous builders; and, after long-protracted disputes about their merits, the question was referred to Mr. Jeffries, afterwards Chief-Justice, and he decided in favour of Schmidt.

The flute, pipe, flageolet, and boy's whistle, were originally in the same form. The side flute was a German invention, of the past century.

Cremona violins of 1660 are pure tone, and superior to all others: not so loud, but more effective in an orchestra.—*Gardiner*.

The pianoforte was invented, in London, about 1766, by Zumpi, a German.

The trombone is the sackbut of the ancients, and it was revived about 1790, by a model being found in Pompeii. They produce every semi-tone, by sliding out and in, like a telescope tube.

The horn or trumpet has been played in a concert of two hundred trumpeters, from the size of a penny trumpet to twenty feet long.—*Baillot*.

The Compass of the harp extends through six octaves, from five lines below the bass clef, to six lines above the treble. The piano through five octaves, and with extra keys to six. The guitar through two and a quarter. The clarionet three and a half. The horn three. The bassoon three. The flute three. The violin two and a half. The violincello two and a quarter. Voices, two. The Soprano, two notes below the treble, to three above. The Tenor, middle-line of bass to middle of treble. The Bass voice, note below line of bass clef, to second line of treble.

In an organ of eight octaves, the pipes of the lowest are thirty-two feet, and of the highest one inch and a half.

Assimilating tones to colours, Gardiner considers the trombone as deep red; the trumpet, scarlet; the clarionet, orange; the oboe, yellow; the bassoon, deep yellow; the diapason, green; the flute, blue; the horn, violet; the violin, pink; the violincello, red.

De Guignes and Waln concur in pronouncing Chinese music a mass of detestable discord, and a "bruit epouvantable," and, in fact, the sounds produced by the instruments of a Chinese band do richly merit the appellation of "musicque infernale."

Large wooden drums, bells of cast iron, hollow copper, or brazen bowls, pieces of hard wood, struck one against the other, or with small rods, cymbals, flutes, trumpets, brass bells, small drums, guitars, &c. are the instruments of Chinese concerts. Several kinds of trumpet are used, some of them very long and thin, having sliding joints to render them more portable. In addi-

tion, there is a species of harmonica, which has a delightful tone, and a kind of harp or lute, usually made of ebony, which is played on while lying on a table made to support it in a horizontal position. These instruments have a sweet tone, and when really good, command large sums. Few barbarous instruments of music are more celebrated than the *gong*. It is only within a few years that the secret of hammering out the metallic composition of which they are made, was discovered. Military gongs are distinguished by being deeper and heavier. Civil gongs are quite shallow, and appear like a circular sheet of metal simply turned up, two, or two and a half inches all round. The tone is, of course, less full and sonorous.

Large bells are one-fifteenth of the diameter thick, and one-twelfth of the height. Bell-metal is made of copper and tin. Small bells, made of tin, silver, copper, or gold, give sounds in acuteness, as 253, 260, 282, 294, respectively. They were used in English churches about 700; and, for that purpose, consecrated with peculiar ceremonies: some say, baptized, and had proper names given them. Popes themselves assisted in this absurdity. They were supposed to put demons to flight, and were rung during eclipses, to drive away the dragon which was about to devour the moon; and which dragon the astrologers still recognize, by calling the northern node the dragon's head, and the southing node the dragon's tail; to which they ascribe potent effects. On St. John's Day, they were rung furiously, to put his devils to flight, and prevent the storms. A Popish council, by formal decree, directed that bells should be blessed, to affright demons and witches, avert lightnings and whirlwinds, and baffle the spirits of the storm; and, for the benefit of departed souls, bells were to be tolled; nine knells given for a man, six for a woman, and three for a child; a custom which still continues.

The bells at Pekin weigh 120,000 lbs., and there are seven of them. The great bell at Moscow is 70 feet in circumference, and 21 feet high, and weighs 440,000 lbs.; that at Erfurth weighs 252,000 lbs., and the clapper, 12 feet long, weighs 1100 lbs. The cathedral, at Antwerp, has a musical combination of 33 bells, the largest seven feet wide, and eight feet high.

Peals of five and six bells are plaintive and melancholy. Those of eight and ten, lively and joyful.

The trebles of York Minster and Bow Church are 8¾ cwts., and the tenors 53 cwts.

A peal of 8 bells is the diatonic scale. St. Paul's bell is on the chord B flat, but on the old scale was C, when the pitch was lower.

The Hon. Robert Boyle believed, and gravely published, that the sound of a drum, made of wolf's skin, would break another made of sheep's skin; and that a harp, strung with fox gutstrings, would make hens fly away. His philosophical writings, and even those of Lord Bacon, abound in gross superstitions of this kind.

All ancient music was in the minor key, without harmony or counterpoint, and entirely vocal and rhythmical, like our recitative.—*Burney*.

Prudentius, in the fourth century, set notes to the Romish breviary; and Flavianus established the first choir at Antioch.—*Wallis*.

Others say, that Pope Gregory invented the method of chanting. He also repeated the same letters for successive octaves, previously designated by fifteen letters. These seven letters are still used. Points were placed in lines over the letters, which Guido simplified by rejecting the letters, and expressing the notes by the points only, and superadded the system of *solmisation*, as still practised, instead of the Greek ta, te, the, tho. Guido for this, in 1022, was honoured by the Pope.

Luther was the inventor of metrical psalmody, about 1517, and it spread with the Reformation. The first tunes were popular airs and dances. The old hundredth was a love-ditty; *Rebuke me not*, was a jig, and *Stand up, O Lord*, was a Poitou-dance.—*Gardiner*.

Madrigals, for four or five voices, were very fashionable in the seventeenth century, when Marinzio, Este, Morley, and Wilbye, composed the still favourite ones. Catches are of the same age. Latterly, bands of street-minstrels have performed them with delightful effect.

Scotch music is referred to their James I.

Scotch tunes, in which the fourth and seventh are omitted, seem to be formed from the Greek lyre, of six or seven strings. They were first publicly performed in a concert in London, in 1722.

The Scalds, were poets and priests of Iceland, whose rhapsodies form the Edda.

The violin had its origin in Italy, about 1600; and the most eminent makers were the Amati, and Stradua-rius of Cremona, about 1650 and 1660. It has a scale of four octaves, and so great a variety in the bow, that a bar may be bowed above 50 different ways.

Paganini was the most wonderful vio-

linist that ever appeared, and he transcends with the G string by itself, all other performers with the four strings. His first appearance in England was at the Opera House, on June 3, 1831, and his performance was so miraculous, that it is an epoch in our musical history.

Feriandi played on an oboe with one leather joint, by twisting which, he imitated the tones of the human wind-pipe.

The art of singing is new, and, till the last century, was the mere result of good voice. Female performers were not employed till the Restoration; and the first Italian lady appeared in London, in 1692. Mrs. Tofts, Mrs. Anastasia Robinson, Miss Brent, and Miss Young, were the precursors of Mara, Billington, Salmon, Catalani, Grassini, Pasta, Sontag, Ronzi, Malibran, Paton Wood, Stephens, &c. &c. Since singing became a science, male singers have been more rare; and Farinelli was the wonder of one age, and Braham of our own age.

Farinelli could sing 300 notes without drawing breath; fifty exhausts most singers.

The vocal tone extends farther than the speaking; and, hence, the advantage of chaunting in all religious assemblies, and tones in street-cries.

Complication, in music, advances with the musical education of the ear. The breve, now so long as not to be used, was so called from its once-esteemed brevity. The grave and sober Corelli and Arne gave way to Haydn and Mozart, who, in turn, are beginning to give way to Beethoven and Rossini.

At the commemoration of Handel, in Westminster Abbey, 1791, there were 250 violins, 50 violas, 50 violincellos, 27 double bass, 118 wind instruments, 8 drums, and 1 organ. In voices, 160 trebles or soprani, 92 altos, 152 tenors, and 159 basses. In all, 1077; and 377 string-instruments did not overpower the solo voice.

A perfect orchestra, as arranged by Gardiner at two late oratorios, consisted of 82 of five-stringed instruments, 22 of wind, and 146 voices, in all 250, with an organ.

A late French orchestra consisted of 134 stringed instruments, 35 wind, and 178 voices; in all 346.

Gardiner, under the sanction of George the Fourth, and Manners, Archbishop of Canterbury, has adapted 220 strains of Haydn, Mozart, and Beethoven, to as many of the best versions of the psalms.

Mozart excelled in operas and airs, and the adaption of accompaniments. Haydn excelled in symphonies and quartetts; but, even in these, Mozart excelled. Both of them declared Handel their superior. Beethoven and Weber were other master-geniuses, fostered by the liberal patronage of their common country.

Beethoven was deaf in his last ten years, and in that time produced his best compositions.

A musical ear is an effect of early experience; hence, the prodigies of Mozart, who composed at four, and Crotch, who played at two, brought up by professional parents.

Beethoven, in one of his compositions for piano-effect, has marked 200 notes to be played with one bow; and, in another, has assigned 43 bars to one bow of the viola.

The Italians call the lower notes the *voce de petto*, the voice of the breast; and the higher notes, the *voce de testa*, or voice of the head. The former is what is called the language of the heart; the latter, in men, is called *falsetto.—Gardiner.*

All voyces, great and small, base and shrill, weak or soft, may be holpen, and brought to a good point, by learninge to singe.—*Ascham.*

A firm and decided tone is produced by quick opening of the mouth.

Latin prosody is false in principle. Words are of all lengths, not merely long or short. The Trochee and Iambic move in triple time, and the Dactyl and Sponde in common time, but the syllables are of every measure of length.—*Music of Nature.*

The words and syllables of language are like notes in music, of all lengths, and this is the rhythm of language. The adagios of Haydn and Beethoven consist of sounds of all lengths; and passages of Shakspeare and Milton are also combined of words slow and rapid. *Ibid.*

Miners distinguish the substance bored by the sound; and physicians distinguish the action of the heart by a listening tube.—*Gardiner.*

The same author states, that gamblers and pie-men can distinguish, in tossing money, which side is undermost, though covered by the hand.

For sonnd and music, the words in the English language are not well assorted. It is powerful but rough, and though so copious, it is deficient in delicacy and flexibility.

The best figure for a concert-room is a double cube.

The French speak in the nose, the Germans in the throat, and the English through the teeth. The nose and roof of the mouth are the sounding-board of the voice; the teeth, the bridge of the lips, and tongue, on whose activity,

form, and skilful use depend the modulations of tone. The speaking voice is a machine, whose use children should be taught. —*Music of Nature.*

M. Kempelon, an Hungarian, lately made a speaking-machine. It consisted of a reed, or glottis, of air-chest with valves, bellows for lungs, a mouth and jaws, and nostrils. It pronounced most letters perfectly, but D, K, G, and T, imperfectly; and even long words and sentences with great facility.

The sound of a tuning-fork may be distinctly heard at the distance of 200 yards, by connecting the stem by packthread with the ear.

The sound called the breve, in ancient music, is now divided in 64 demi-semiquavers, and sometimes in 128 notes of slow movements. The division is into 2 semibreves, 4 minims, 8 crotchets, 16 quavers, 32 semi-quavers, and 64 demi-semi-quavers; or half, if the semibreve is fundamental.

Gardiner, in his *Music of Nature*, has put into notes the songs of 24 birds, and 20 animals. Also about 20 expressions of human passion and feeling, and tones of 8 or 10 insects. The gnat gives the note A on the second space. The death-watch calls in B flat, and answers in G. The three notes of the cricket are in B. The buz of a bee-hive is in F. The wings of the house-fly are F in the first space. The humble-bee is an octave lower. The cockchafer is F below the line.

Hawkins's History of Music, and Burney's, are two of the most amusing books in the language, and the grammars of Callcott and Busby, with the Dictionary of Busby, afford all the information which the musical student can desire.

The best public performers in London in the passing winter, are the following, according to the average of opinion and criticism.

Violin—Paganini, Mons. De Berlot, Spagnoletti.
Violincello—Lindley.
Double Bass—Dragonetti.
Flute—Drouet, Nicholson, Polou.
Horn—Puzzi.
Clarionet—
Piano—Moschelles, Field.
Harp—Bochsa, La Barre.
Organ—Greatorex, Purkis, Sale.

VOICES.

Soprano—Pasta, Wood.
Alto—Rubini, Braham.
Bass—La Blache, Phillips.

The current public performances are the Italian, German, and French Opera. The Philharmonic Concerts, the Concerts of Ancient Music, besides the operatic performances at Drury Lane and Covent Garden.

ENGLISH LAW & GOVERNMENT.

Law, in its general sense, signifies a rule of action which a superior authority has dictated, and which the community are bound to obey. The law of nature is a principle of self-love, or the individual pursuit of ***happiness***. The law, in practice, however, is the primary and chief cause of half the ***miseries*** of human life.

The law of nations is an expression of the law of nature, which different nations and states, in their intercourse with each other, have agreed to adopt, and is to be found in Vattel, Grotius, Puffendorf, &c.

The law of England is made up (1) of the acts or statutes of the legislature, (2) of decisions of judges which are reported or recollected, and of such of the *dicta*, records, opinions, and usages of the writers, court, and practitioners of the law, and of the public, as have been sanctioned by time, and which, in case of any question, the judges feel themselves bound to respect. This branch consists of two divisions, one called the Common Law and the other Equity. (3) The Romano-Civil Law, the Code of Justinian and others, consisting of the Institutes, Digests, or Pandects, Imperial Constitutions or Novels. The Canon or Romish law, consisting of the Decretals, Epistles, Bulls, &c. published by the Popes of Rome, from 1150 to 1580.

The two foreign systems guide our Ecclesiastical, Admiralty, and University Courts.

The laws of England are intricate and embarrassed, because they are a succession of patch-work — laws to amend and improve, and not harmonious wholes, with parts exactly fitting and squaring one part with another part. There are too many legislators either for easy or free discussion, and, being so numerous, they are split into many sects and parties, who seldom agree to understand each other. He who talks loudest, longest, and with the greatest confidence, usually influences the decision; and wisdom, justice, and benevolence are secondary and subordinate. Better arrangements for cool consideration are indispensible, and some tests of proficiency in the principles of law and government ought to be imposed, when the oaths and seats are taken.

The peculiarities of the legal constitution of England are, the parliament, equity jurisdiction, ecclesiastical jurisdiction, corporation franchises, the unpaid magistracy, and the compulsory maintenance of the poor.

The free parts of the English consti-

tution, and the securities of civil liberty, were procured by Magna Charta, in 1216,—by Simon de Montford, Earl of Leicester, who obtained the first parliament in 1256,—by the concessions of Edward I., in return for subsidies to sustain his wars,—by the Trial by Jury,—by the Petition of Right, drawn by Lord Coke,—by the Habeas Corpus Act, drawn by Lord Shaftesbury,—by the Bill of Rights and Act of Settlement,—by the Libel Bill of C. J. Fox,—by the Catholic Emancipation Bill,—and, finally, by the Reform Bill of 1831, planned by Lord Grey. The system would be more perfect if sheriffs were obliged to summon juries in exact rotation from three districts; if elections were made by ballot, so as to render volitition free, and bribery useless; and if members of municipal corporations were chosen by the inhabitant householders.

100 oppressive laws of the last 20 years, 800 millions of debt, and 60 millions of annual taxes, proved the necessity of a reformed parliament, but the last even delegated its legislative power to the legal administrators, and authorized *them* to make *Rules of Court*, on points of practice, as binding on the people as real laws. It would fill a volume to expose the consequent impropriety (to say the least) of these rules;—but the first act of a reformed parliament should be to abrogate the whole, and reconcile legal practices with liberal and just principles.

Common law is the unwritten law of the country, founded on custom, usage, and maxims derived from common sense; but is varied by written, printed, or statute law, made for the purpose of correcting and defining common law.

The British laws were translated into Saxon in 590. Alfred compiled the Saxon common law in 885. Edward the Confessor promulgated his laws, 1065. Stephen's charter of general liberties, 1136. Henry the Second's confirmation, 1154 and 1175. Magna Charta, by John, 1215. Confirmations, by Henry III., in 1216, 1224, 1237, 1250, and 1264. Forest charter, 1225. By Edward I., 1297 and 1299. By Edward III., in 1345 and 1368.

Domesday Book, the most ancient record in Europe, is the report and returns of a survey of nearly the whole of England, made by order of the Conqueror. The Chapter House, Westminster, is the place of its deposit. It consists of 2 vols., and has been illustrated by Kelham, and published verbatim by the Record Commissioners. The distribution of the counties in the two volumes, and the orthography of their names, are given below. The survey of the four northern counties is not contained in that record, but they are in another, called the Boldon Book.

Counties in the Orthography of Domesday Book.

VOL. I.

Chenth.	Herefordscire.
Sudsexe.	Huntedunscire.
Sndrie.	Bedefordscire.
Hantescire.	Northantscire.
Berrochescire.	Ledecestrescire.
Wiltescire.	Warwicscire.
Dorsete.	Hartfordscire.
Sumersete.	Sciropescire.
Devenescire.	Cestrescire.
Cornvalgie.	Inter Ripam &
Midelsexe.	Mersham, (Lancasbire.)
Hertfordscire.	Derbyscire.
Bockinghamscire.	Snotingbamscire
Oxonefordscire.	Roteland.
Glowecestr'scire.	Eurvicscire.
Wirecestrescire.	Lincolnscire.
Gentebr'scire, (Cambridgesbire.)	

VOL. II.

Exsessa. Norfulc. Sudfulc.

The Conqueror and his Son Henry were active legislators. There are 81 capitula of the Conqueror's laws, but they were a private collection, apparently of modern date, and are not of authority. Their laws were made in great councils. Edward I. effected very great improvements in our laws, by parliamentary measures. The reign of Edward III. also fills a distinguished space in English legislative history.

It divides the land into oxgangs, or bovates, of 12 or 15 acres; virgates of 40 acres; carucates of 8 oxgangs, or 100 acres; & hides of about 120 acres more.

In Domesday Book a carucate, or 100 acres, was valued at only 32*d*., and 4 at 10*s*.; and sometimes at only 8*s*.

The barons, or tenants in chief, or freeholders, by Doomsday Book, were 700; but, being split into small parts, were greater and lesser, all of whom were entitled to sit in parliament; but, in 1307, the latter, or lesser barons, were allowed to choose two representatives; hence called knights of the shire.

Danegeld was a land-tax imposed by Ethelred, to enable him to expel the Danes, but retained after.

The tyrant, William I., to preserve his game, made it forfeiture of property and imprisonment to disable a wild beast; and loss of eyes for a stag, buck, or boar. Of these laws, the clergy were zealous promoters; and they protested against ameliorations under Henry III.

The curfew was a law only till the accession of Henry I. Since that time, the 8 o'clock evening-bell has been a

custom only. Henry, at the same time, voluntarily proclaimed the first charter of liberties, which was confirmed by Stephen and Henry II., but neglected till extorted from John.

England was under an interdict from 1207 to 1214. Archbishop Langton absolved King John, on promise that he should restore the charter of Henry I.; and John afterwards yielded his kingdom twice to the Pope. In 1215, the barons took the field at Stamford, under Robert Fitzwalter, Baron of Dunmow, and all deserting John, he met them on June 15, at Runnemede, a meadow between Staines and Windsor, when the great seal was affixed to the charter, and 25 barons were elected to secure its fulfilment, and they were put in possession of the Tower of London. Twelve knights were also appointed to rectify the forest laws. John was so indignant, that he died in October, at Newark, as was said, by poison, or of a broken-heart. His son, Henry III., afterwards confirmed them in 1236 and in 1253, in Westminster-hall, with great solemnity. Edward I. did the same before he could obtain supplies or service. There were, therefore, five charters—one of John, three of Henry, and one of Edward I., the same in spirit, but slightly varied in expression.

Magna Charta provides that fines or amerciments shall never destroy a man, and, therefore, all such are unlawful. It saves a freeholder's estate, a merchant's merchandize, a scholar's books, a workman's tools, &c.

By Magna Charta, 10*d.* was fixed as the price per day of a cart with two horses, and 1*s.* 2*d.* with three.

Parliaments were fixed by the 14th chapter of Magna Charta, by a pledge to summon archbishops, bishops, abbots, earls, and great barons; and, by the sheriffs, all who held a fief, after 40 days' notice, which was to express the cause; and, by chapter 13, it is provided that no scutage or aid shall be imposed, unless by this common council of the kingdom.

The language of Charters and Statutes were in Latin or French till Henry VII. The statutes of Henry III. are in Latin. The first use of English was in 36th Edward III.

The Charta de Foresta was of the same year. It contained many vexatious provisions, and some interesting ones; thus it shows the early use of marl in agriculture, the value of honey, before sugar, was abundant and cheap, and the ecclesiastical epicurism for forest venison.

The original of Magna Charta, preserved in the British Museum, is 14½ inches broad, and 20½ long. Another copy is 17 by 21.

Originals of Magna Charta, or contemporaneous copies of it, and confirmations, are in the Museum, the Chapter Houses of Lincoln, Durham, Norwich, and Wells. Also in Corpus-Christi, Cambridge, and Oriel, Oxford; in the Bodleian and Ashmole Museum. At Rochester is a charter of liberties, granted by Henry I. in 1101, and at Exeter another, by Stephen, in 1136.

A Feod, or feud, was a grant of land to a vassal, on condition to the lord, as for military service, &c. This was the feudal system.

No election of representatives in England took place before the 49th of Henry III. Those who held *in capite* of the King were, however, part of the great council in king John's time, when aids and escuage were to be granted to the king. The commons were always a distinct assembly. The system of representation commenced in Scotland in 1427; but the lords and commons sat together till the union of the two kingdoms.

The earliest parliamentary roll extant is of 18th Edward I. It is a grant to the King by several peers for the marriage of his daughter. The 9th of Edward II. is a grant by the citizens, burgesses, and knights for counties. In 13th Edward III. the commons conditionally granted 30,000 sacks of wool; but on the same day the earls and barons, for themselves and peers, by barony granted every 10th sheaf, every 10th fleece, and every 10th lamb. In 18th Edward III., the lords and commons made separate grants. The Speaker was called parlour and procurator till 1st Henry IV.

In the 40th Edward III., the lords met in the White Chamber, the Court of Requests, and the commons in the Painted Chamber.

The first impeachments by the commons was in 50th Edward III.

In 51st Edward III. the commons were ordered to meet in the Chapter House, and Sir Thomas Hungerford is mentioned as Speaker.

Down to 1831, ENGLAND elected 40 knights of shires, worth 600*l.* per annum; 50 citizens, from 25 cities; 334 burgesses, for 167 boroughs; and 5 worth 300*l.*; 4 for the two universities; and 16 barons for the eight cinque ports. The 12 counties of WALES send 12 knights; and 12 boroughs, 12 burgesses. SCOTLAND returns 30 knights for 33 counties; and Edinburgh, 14 burghs, 15 burgesses; Ireland, for 32 counties, returns 64 knights; 7 cities, 9 citizens; 26 boroughs, 26 burgesses; and one for Dublin University. In all 658;

a majority of whom are returned by peers or purchase.

The revised REFORM BILL, introduced in December, 1831, gives to 25 of the larges counties two additional members.

Universities as before.

Fifty-six Rotten Boroughs disfranchised,

Thirty small boroughs reduced to one member.

Twenty-two populous places are to return two members each.

Nineteen large towns one member each: Making, for England and Wales, 500 members.

No member must be under 21 years of age, nor hold any office under the crown, but may be re-elected. No person in clerical orders can be admitted. All tax and money bills must originate in the Commons. Freedom of speech is guaranteed; and also freedom from arrest for debt for 40 days before and after prorogation; but a member may, after two month's process for 100*l.* be made bankrupt.

The Speaker of the House of Commons has 6,000*l.* per annum, 1,000*l.* and 2,000 ounces of plate on election; two hogsheads of claret, and 100*l.* of stationery, besides perquisites from the printer, &c.

In the HOUSE of COMMONS no decision can be made unless 40 members, out of the 658, are present. But, as the House does not meet till evening, and sits after midnight, many important questions are decided by small majorities of 40 or 50 members.

The patronage of government is usually bestowed on the recommendation of members of parliament; and this power apparently operates as the remuneration for their time and service. But, if constituents paid every member 300*l.* per annum, their remuneration, thus effected, would not cost 200,000*l.* per annum, while the system has now cost unascertainable millions.

The House of Commons was the ancient chapel of St. Stephen, part of the royal palace of Westminster, and built by King Stephen. In 1550, it was suppressed, with other religious houses, and fitted up for the use of parliament.

Before members of parliament paid themselves out of the public money, their constituents used to allow a knight of the shire 4*s.* pr. day; and burgesses 2*s.*

In discussing the CATHOLIC RELIEF-BILL, in March and April, 1829, there were 939 speeches in parliament.

In the sessions of 1829, 63 public and 207 private acts were passed, 162 of which were for improvements.

In 30 years, about 2000 INCLOSURE-BILLS have passed, at a cost, in fees, &c. of at least one million; by which 108,000 acres, out of 18 millions of waste in the United Kingdom, have been enclosed, at a cost of nearly 10*l.* per acre for fees and expenses of getting the bills.

The CHILTERN HUNDREDS are an estate of the crown, on the chalk-hills, which lie between Bedford, Oxford, and Buckinghamshire; and the stewardship is a nominal office, conferred, for a small fee, on members of parliament, who desire to vacate their seat, by accepting an office which renders them ineligible.

The House of Commons has an establishment of about 60 clerks, doorkeepers, &c. The House of Peers about 40.

The House of Commons, in the reign of Henry VIII., consisted of only 334 members. Additional writs were issued to other places within the next two centuries, making them 513; 45 Scotch members were added in 1706, and 100 Irish in 1801; making 658, the late House of Commons.

The long parliament met on the 3d of November, 1640. The five members were impeached Jan. 3, 1642, and demanded by the king in person. They fled into Coleman-street Ward, and Charles himself fled, in a few days, to Nottingham, and on the 11th the five members were brought back by water in triumph to the House of Commons.

The act for abolishing the House of Lords, as useless and dangerous, was passed on the 19th of March, 1648. Soon after, another act was passed, declaring England a free state and commonwealth, to be governed by representatives, who were to appoint ministers.

After the death of Charles I. commissioners were appointed to sell all his wardrobes, pictures, statues, plate, household goods and effects, in his 17 palaces and castles, which included those of Somerset or Denmark House, Greenwich, St. James, the Tower, Whitehall, Hampton-court, Richmond, Sion, Wimbledon, Bewdley, Royston, Newmarket, Holdenby, Woodstock, Carisbrook, Kenilworth, and Ludlow.

During the Saxon period, there was a minister of justice, "Jotius Angliæ Aldermannus." After the Conquest, the powers seem to have continued in the Capitalis Justiciarius Angliæ, the chief of the "Aula Regia," the only superior court. Edward I. broke up this court into three, the King's Bench, the Common Pleas, and the Exchequer, and appointed a chief to each. They long continued, with a number of judges, unsettled, but usually 12, until the Act 1st Will. IV. by which act three additional judges were appointed.

The jurisdiction of the courts has been from time to time extended by fictions.

Westminster Hall, &c. was the site of the palace of the invader William and his sons, Rufus and Henry I. and their descendants, till Henry VIII.

The TEMPLE was established in 1185; Lincoln's-inn, 1310; and Gray's-inn, 1357. They have masters, treasurers, deans, stewards, librarians, &c.

The common law is, as it were, held in solution in the reports, &c. From which it can be precipitated only by the skilled professional lawyer; who, though he make use of the digests and abridgments, &c. intelligible to himself, would deprecate the making of any digest of it which should be intelligible to the people.

Glanville, in the age of Henry II.—Bracton, in that of Henry III.—Britton, in that of Edward I.—Fleta, in that of Edward III. — Fortesque, in that of Henry VI.—are the most ancient writers on the common law. *Bracton* drew his materials from the Justinian code, but without acquainting his countrymen of their source. *Glanville*, in some places, refers to statutes passed in the Great Council, of whose existence we have no other intimation.

There are about 200 text-books (exclusive of parliamentary law) of more or less authority.

The Year Books are the reports from the reign of Edward II. inclusively, taken, in a regular series, by the appointed officer, at the expence of the State, and published annually. Reports have been since continued by private hands.

The number of report-books in the law, exclusive of Admiralty and Ecclesiastical Courts, is about 350, of which 170 are folios or quartos, and the remainder octavos, except about 5 duodecimos. There are about 50 volumes of indexes, digests, and abridgments of law and equity; yet every man is presumed to know the law!

Littleton's Tenures is a small tract, compiled in the reign of Edward IV. out of the Year Books, and by its editors broken into 750 sections. This Sir Edward Coke employed as the text of his common-place book, and, under some of its sections, he noted down most of the points of law and science, 3d Char. I. a space of 56 years, in which which occurred to him from 14th Eliz. to latter year he published an edition of the Tenures, calling it The First Institute. Sir E. Coke also wrote and published three other books, which he called the Second, Third, and Fourth Parts of the Institute.

Records in court were written in Latin, except during the Commonwealth.

French was spoken in proceedings of courts of law, until ordered to be in English by stat. 6th Edw. III. because the king and his nobles had, in travel, observed that people were better governed by laws in their own tongue.

Law books were frequently written in law French so late as the reign of William and Mary.

The barbarisms of this language still compose a large part of legal nomenclature.

In 1284, Edward I. convened the Parliament at Acton Burnel, between Shrewsbury and Wenlock. The peers met in the castle, and the commons in a large barn.

Keepers of the peace were chosen by the inhabitants of each county. But, in stat. 34th Edw. III. c. 1, a standing authority, or commission, was given to the keepers of the peace.

In printing the early statutes, in 1543, many very important ones, still in the rolls of both houses, were omitted by the editors and printer; and apparently for no other reason than that they were inaccessible to them. The enrolments of grants and charters, from Will. I. to Hen. III. still exist in the Wakefield Tower, and are the oldest. The charter rolls to cities, towns, &c. from 1199 to 1483, are also preserved in the Wakefield Tower. The parliament rolls, since Richard III. are kept at the Rolls' Chapel.

5500 are now printed of new public acts, and 300 of others. The public are sent to members, public offices, justices of the peace, sheriffs, town clerks, &c.

Ruffhead's edition of the Statutes at Large now consists of 31 volumes, quarto. Seven and a half comprise the legislation from Hen. III. to the accession of Geo. III. In that single reign, 16½ volumes were added.

The Lombardic, or Norman writing character, was introduced by William I. and continued till Richard II. Set Chancery, Common Chancery, and Court hand, prevailed till Henry VIII. Secretary hand, or text, still in use among lawyers, began to be adopted at the Reformation. Modern Gothic was used by the monks. The Saxon records are strong, large, and plain, and those of Richard I. and John are small and much abbreviated.

The COURT OF CHANCERY has a lord-high-chancellor, vice-chancellor, master of the rolls, accountant-general, 16 clerks, besides secretaries of bankrupts, lunatics, presentations, briefs, appeals, with numerous clerks, &c. &c. Also 6 clerks in chancery, 3 of the petty bag, &c. &c. with numerous assistants.

The chancellor's salary is 10,000*l.* per annum, with 5,000*l.* retiring pension, besides 4,000*l.* per annum as speaker of the House of Lords.

The LORD CHANCELLOR is at the head of the administration of the law in England; and, since the age of Elizabeth, unites this power with that of Lord-Keeper. He is sole judge in his own court of equity; and also president of the House of Lords; and a member of the cabinet council. There is also a Vice-Chancellor, who presides in a second court of equity; and the officer, called the Master of the Rolls, presides in a third. Their object is to give equitable construction to agreements, and often to supply their place, or any deficiency in positive law. The Lord Chancellor is also the general guardian of charities, persons under age, and of unsound mind, and till lately the arbiter in questions connected with bankruptcy. The enormous expences of chancery proceedings have, however, for many years rendered it useless to persons of moderate fortune; and, therefore, it has too often been made use of by the rich to oppress the weak, and is commonly resorted to by trustees and assignees, who go to law with money not their own.

The property of wards, trusts, minors, suitors, &c. standing in the name of the Accountant-General, in 1832, is about 50 millions; in 1826, it was 39 millions; and, in 1726, but 741,000*l.* Such are the encroaching powers of this jurisdiction.

Lord Keepers and Chancellors since the Revolution:—

Earl Somers	1693.
Sir Nathan Wright	1700.
Earl Cowper	1705.
Earl Harcourt	1710.
Earl Cowper	1714.
Earl of Macclesfield, (convicted of bribery.)	1718.
Lord King	1725.
Earl Talbot	1733.
Earl of Hardwicke	1736.
Earl of Northington	1757.
Earl Camden	1766.
Charles Yorke, (committed suicide in 3 days.)	1770.
Lord Apsley	1770.
Lord Thurlow	1778.
Lord Loughborough	1783.
Lord Thurlow	1783.
Lord Loughborough	1793.
Earl of Eldon	1801.
Lord Erskine	1806.
Earl of Eldon	1807.
Lord Lyndhurst	1827.
Lord Brougham	1830.

The Chancery Court in Ireland is similar.

The THREE COMMON LAW COURTS, at Westminster, have each 5 judges; and each about 60 officers, clerks, &c. &c.

The judges have 5,500*l.* a year; and future ones are to have 50,000*l.* The Court of King's Bench, per Mr. Brougham, had 61,000 causes in 1829; which, at an average cost to both parties of 150*l.*, was above 9 millions; but many cost double or treble that sum. Law expenses altogether, civil and criminal, cost, in 1829, above 20 millions; supporting 30,000 judges, recorders, barristers, commissioners, attornies, officers of courts, scriveners, &c.; with average incomes of 400*l.* each, besides stamps to the revenue and witnesses.

JUSTICES IN LAW are the eight judges in the King's Bench and Common Pleas; and the heads are called chief-justices. In the Court of Exchequer, the judges are called barons; and the chief, lord-chief-baron. They expound the statute law, and apply the common law; and make rules of court often equivalent to laws, having, in all respects, great power and discretion, but restrained by counsel, and by the verdicts of juries.

JUSTICES of the PEACE are local magistrates, also with extensive powers in minor cases; but liable, for misconduct, to be superseded, or punished by the Court of King's Bench.

The HOME CIRCUIT goes to Hertford, Chelmsford, Maidstone, Horsham, Lewes, Kingston, or Guildford, or Croydon.

The OXFORD CIRCUIT goes to Reading or Abingdon. Oxford, Worcester, Stafford, Shrewsbury, Hereford, Monmouth, and Gloucester.

The MIDLAND CIRCUIT goes to Northampton, Oakham, Lincoln, Nottingham, Derby, Leicester, Coventry, and Warwick.

The WESTERN CIRCUIT goes to Winchester, Salisbury, Dorchester, Exeter, Launceston or Bodmin, Bristol, Taunton, or Bridgewater, or Wells.

The NORFOLK CIRCUIT goes to Buckingham, Bedford, Huntingdon, Cambridge, Ely, Thetford, or Norwich, and Bury St. Edmund's.

The NORTHERN CIRCUIT goes to York, Durham, Newcastle, Carlisle, Appleby, and Lancaster.

CHESTER CIRCUIT goes to Chester, Mold, Welsh Pool, and Ruthin.

The SOUTH WALES CIRCUIT goes to Cardigan, Pembroke, Caermarthen, and Haverford West.

The BRECON CIRCUIT goes to Cardiff, Brecon, and Preisteign.—Some alterations are proposed to be made in the distribution of these Circuits.

The NORTH WALES CIRCUIT goes to Beaumaris, Caernarvon, Bala, or Dolgelly.

There are 12 POLICE-OFFICES in London, besides the Mansion-house and Guildhall, and the New Police, or Gens-d'armerie Establishment.

QUARTER-SESSIONS are held throughout England in the weeks after Jan. 6; after Easter week; after July 7; and after Oct. 11; except otherwise fixed by advertisement.

The permanent constitutional councils of the King of England are, the Parliament in legislation, the Judges in matters of law; and the Privy-council, of which, the Cabinet of ministers is a select committee, in regard to foreign and domestic policy.

The public administration, in London, consists of 12 cabinet ministers, 3 ministers not in the cabinet, and the attorney and solicitor-general. In Dublin, there are 4, besides the lord-lieutenant, and attorney and solicitor-general. In Edinburgh, 8.

The Twelve Ministers are of the Cabinet Council :—

The Lord President.
The Lord Chancellor.
The Lord Privy Seal.
The First Lord of the Treasury.
The Chancellor of the Exchequer.
The Home, Foreign, and Colonial Secretaries of State.
The President of Board of Controol.
The President of Board of Trade.
The Master of the Mint.
The First Lord of the Admiralty.

The TREASURY is under the direction of 6 Lords-commissioners, 2 secretaries, 6 chief clerks, and about 120 other clerks.

There are 3 SECRETARIES OF STATE, Home, Foreign, and Colonial, each with the 2 secretaries, and a chief clerk; and, in the first, a secretary, under-secretary, and chief clerk for Ireland. Each of them employs about 30 clerks.

For the ADMIRALTY, there are 5 commissioners, with a secretary, and about 60 clerks.

The High Court of Admiralty has 2 judges, 2 advocates, 2 proctors, a registrar, &c.

The WAR-OFFICE, in 1830, was under a secretary and under-secretary, with abont 80 clerks, and 16 messengers.

The office of the COMMANDER-IN-CHIEF has 4 secretaries, 4 aides-de-camp, and 12 clerks.

There were, in 1830, 169 PRIVY-COUNCILLORS, 113 of whom divide, annually, 650,000*l.* of the public money, of which, 86,000*l.* is in sinecures, and 121,650*l.* in pensions; 47 of them are peers, who divide 378,846*l.*, and 22 commissioners, who divide 90,849*l.*

Besides the ATTORNEY and SOLICITOR-GENERAL, the crown is supported by an ancient serjeant, 4 serjeants, and 38 king's counsel.

The BOARD of Royal WOODS, FORESTS, &c. is under 3 commissioners, and employs about 30 clerks, and 20 receivers.

The Board of Public Works is under a surveyor-general and assistant, aided by 25 clerks, architects, &c. &c.

The NAVY-OFFICE, for all details of the Navy, has a comptroller, a deputy, 3 commissioners, and above 100 clerks and assistants. There is also a Navy-Marine Pay-Office, with treasurer, paymaster, and about 80 clerks.

The NAVY VICTUALLING-OFFICE, in 1830, was under 6 commissioners, and a secretary, with about 60 clerks, and 80 others, with agents, &c. at stations and hospitals.

HERALD'S COLLEGE has an earl-marshal, 3 kings of arms, 6 heralds, 4 pursuivants, and 2 extra heralds. It was founded by Edward III., in the age of tilts and tournaments.

There are 6 heralds attached to the college; Richmond, Lancaster, Chester, Windsor, Somerset, and York. Pursuivants are attendants on heralds.

There are, at least, 50,000 coats of arms in use.

There are ROYAL ESTABLISHMENTS at St. James's, Buckingham-house, Kensington, Kew, Hampton-court, Windsor, Brighton, and Edinburgh; with sundry officers and assistants at each; and Kensington, Kew, Hampton-conrt, and Windsor, have extensive domains. At Holyrood-house, the state-officers of the kings of Scotland, before 1603, are still retained.

The HOUSEHOLD of the King of England is governed by a lord-chamberlain and vice-chamberlain, with 8 clerks; there is a keeper and secretary of the privy-purse; a master of ceremonies and assistant; 19 gentlemen ushers; 14 grooms of the privy and great chamber, a groom of the stole, 12 lords of the bed-chamber; 12 grooms of ditto; a master and a groom of the robes; 16 pages, 40 gentlemen of the privy-chamber, 8 serjeant-at-arms, 8 messengers, 25 musicians, 8 trumpeters; a lord-steward, a treasurer, a comptroller, a master of the household, 3 clerks and 3 messengers, a pay-master, a lord high-almoner, a sub-almoner and a grand almoner; 3 officers of the envoy, 6 of the silver scullery, 7 of the coal-yard, 12 of the wine-cellar, 3 in the confectionery; 5 clerks of the kitchen, a chief-cook, 2 master-cooks, 25 men cooks and apprentices, 2 yeomen of the mouth, 2 of the kitchen, 2 table-deckers, 4 directors of gardens, 2 librarians, and 2 clerks; a master of the tennis-court, a keeper of the swans, a surveyor of pictures, and a poet-laureat; a master of the horse, a grand-falconer, a master of the buck-hounds, a chief equerry, 4 equerries, 4 pages of honour,

2 riders, a huntsman, 2 feeders, 3 whip-pers in, and 131 yeomen of the guard and their officers. Besides keepers of palaces, porters, female servants, &c.

England has 4 ambassadors, with 12,000*l.* a year; 1 with 8,000*l.*; 1 with 7,500*l.*; 3 envoys, with 6,000*l.*; 4 with 4,900*l.*; 4 with 3,900*l.*; and 6 with 2,600*l.* per annum; besides secretaries from 600*l.* to 1,500*l.* per annum.

This foreign diplomacy cost, in 1826, 450,538*l.*; and, in 1829, 366,004*l.*

There are 16 king's messengers for foreign service, 6 for the home office, 8 attached to the foreign office, and 6 to the colonial.

The band of gentlemen pensioners are 40, with 6 officers. The first have salaries of 100*l.* per annum.

The CROWN PROPERTY is valued at 20 millions.

There are 24 ROYAL PARKS, with appointed rangers or wardens, enjoying many immunities.

WINDSOR-FOREST is 66 miles round, including the great and little parks.

The DUCHY OF LANCASTER has its chancellor, and about 30 officers and assistants.

There are between 40 and 50 clerks and state-officers connected with the collection of the revenues of the DUCHY OF CORNWALL.

Hanover has its six ministers of state, and has eight resident envoys from foreign courts. The population is above a million and a half.

Alfred was said to be the contriver of trial by jury, but we have evidence of such trials long before his time. In a cause tried at Hawarden, in Flintshire, nearly a century before Alfred, we have a list of the twelve jurors, confirmed, too, by the fact that the descendants of one of them, called Corbyn of the Gate, still preserve their name and residence at a spot in the parish, called the Gate. It is more probable that Alfred better regulated all these legal provisions.

Originally juries were 12 men, who, on oath, certified their belief of innocence. Then, in formal trials, they were the persons present; and, in time, fixed at 12.

No accusation of crime can be lawfully made by the laws of England, except before a grand jury, sworn to secresy; and 12 must decide that it is true, before the party can be required to answer.

Verdicts of juries must be unanimous, that every one may be responsible to his own conscience and to the parties, and that the decision may be considered as a certainty, not probability.

No English judge can pass a sentence greater than the law prescribes; but he may diminish the extreme severity of the law, as the case requires.

Proof of guilt lies with the accuser, and the accused is not expected to prove a negative. Proof, also, should be positive, and not presumptive. All doubts are construed favourably to the accused; and the opinions of a judge ought to have no weight with a jury, every one of whom ought to think for himself, and decide for himself.

Petty juries are *special* for civil cases, or for trials of treason or political offences, and consist of freeholders or leaseholders of certain estate; or *common*, of smaller estate, for civil, or criminal cases. Their verdict should be matter of *certainty*, not probability or possibility; and, of this certainty, every one of the twelve is bound to be satisfied before he consents to the verdict.

The jury are judges of the criminal intention, as well as of the fact; and they must be satisfied with proof of both before they assent to a verdict, which decides both on the fact and the criminal purpose.

The Saxon penal laws went on a principle of commutation. Every man, from the king to the slave, had his price, and every limb its value, called the "were." The were of a leg or an eye was 50*s.*, of a tooth 1*s.*, of a finger from 6*s.* to 9*s.* A law of William the Conqueror took away all capital punishment; and, instead, directed various kinds of mutilation. An act of 9 Hen. I., however, enacted that one taken in *latrocinio* should be hanged, but it was not executed.

The business of the HOUSE OF PEERS is almost entirely performed by the Speaker, (the chancellor), the Chairman of committees, who reads and revises, as well as exercises a provisional veto on all bills; and the junior Bishop, who attends to read the prayers. Few other peers attend, except on the occasion of public debates; and personal presence is not necessary, because their votes may be taken by proxy.

There are, in the British regular Army, 4 field-marshals, 230 generals, 200 major-generals, 243 colonels, about 800 lieutenant-colonels, and 750 majors.

There are, two regiments called life-guards, 1 royal horse-guards, 7 of dragoon-guards, and 17 of dragoons; of which, 4 are lancers and 3 hussars. In Infantry, 3 foot-guards and 99 of the line. Also a waggon-train, a rifle-brigade, a royal staff corps, 2 West India, 1 Ceylon, 1 African, 1 Mounted Rifle, 1 Newfoundland, and 1 Malta.

Chelsea Hospital is under a governor, lieutenant-major, and adjutant; treasurer, comptroller, steward, and about 60 clerks and assistants.

There are 33 garrisoned places in Great Britain, as towns or castles, 11 in Ireland, and 9 in the colonies. There are also 3 military asylums and 2 military colleges in England, and 1 in Ireland.

The corps of Engineers has a colonel-in-chief, and a second, 5 colonel-commandants, and 11 colonels.

The royal artillery consists of 3 field-officers, 10 colonel-commandants, and 20 colonels.

In the British land-service, the adjutant-general directs all matters of discipline; the quarter-master-general gives orders for marching and quarters; the barrack-master-general manages the barracks; the commissary-general the provisions and stores; the paymaster-general superintends pay and accounts; while the master-general of the ordnance directs the arms, ammunition, depôts, &c.

The price of commissions in the army is, in the cavalry, lieutenant-colonel, 6175*l.*; major, 4575*l.*; captain, 3225*l.*; lieutenant, 1190*l.*; and cornet, 840*l.* In the infantry, lieutenant-colonel, 4500*l.*; major, 3200*l.*; captain, 1800*l.*; lieutenant, 700*l.*; ensign, 450*l.* The horse-guards are 25 per cent. higher; and the foot-guards double.

The daily pay of foot-soldiers is 1*s.*, and 1*d.* for beer; the life-guards day-pay is 1*s.* 11½*d.*; and the annual cost 74*l.* 4*s.* 11*d.* per man, besides horse and allowances; dragoons, 56*l.* 11*s.* 5*d.*; foot-guards, 34*l.* 6*s.*; infantry, 31*l.*

A battalion of 500 has a colonel, lieutenant colonel, major, 10 captains, 12 lieutenants, 8 ensigns, an adjutant, quarter-master, pay-master, surgeon and mate, 32 serjeants, 30 corporals, and 21 drummers.

A regiment of horse-soldiers, of about 360 officers and men, costs about 25,000*l.* per annum.

The British army, during the years of peace 1783 to 1792, was from 30,276 to 39,253 men. The peace establishment, in the year 1826, was 149,000; and, in 1830, 88,500.

The ORDNANCE is managed by a master-general, lieutenant-general, surveyor-general, clerk, storekeeper, clerk of deliveries, treasurer, secretary to the master-general, and chief secretary, with about 160 clerks. And, under this board, is the academy and laboratory at Woolwich; with minor establishments at 35 places in Great Britain, and 31 in the colonies. Each have a store-keeper, deputy, and clerk.

Flying horse-artillery consist of light guns and howitzers, for use where wanted in battle, or to attend cavalry in rapid evolutions.

Previously to Charles II. the only armed force was the 100 yeomen of the guard; and he established, on a foreign model, two regiments of guards. Previously to Henry VIII. there were not any yeomen of the guard.

An iron 42-pounder is 10 feet long, and weighs 67 cwt.; 32 and 24-pounders are the same length, but lighter; 18, 12, and 9 pounders are 4 inches shorter; and the 9-pounder weighs but 30 cwt., taking a charge of 3 lbs. of powder, and the diameter of the shot being four inches. In the merchants' service 9-pounders are 5 feet long, and weigh but 14 cwt.

The English light brass 9-pounder is 5 feet, and weighs 6 cwt., with 3.668 inches calibre, and vent 2.12; 9, 6, and 3 pounders are 17 calibres long; and 24 and 18 pounders, are 13 calibres; a 24-pounder is 6 feet 3, 669 inches long, and weighs 24 cwt.; the 18-pounder weighs 18 cwt., and so down. The 42-pounder weighs 66 cwt., is 16,244 inches calibre, and 9½ feet long; 24-pound iron guns weigh from 31 to 50 cwt., and are from 6½ to 9½ feet long; 24-pound carronades are 5.68 bore, 7 feet long, and weigh 19 cwt.

The first dukes were, Edward the Black Prince as duke of Cornwall, and John of Gaunt, duke of Lancaster. The title was extinct in the reign of Elizabeth, and till James I. made Villiers duke of Buckingham.

Ladies Harcourt, Gray, and Suffolk were, by Edw. III., Hen. V. and VI., made knights of the garter, and wore it above the elbow of the left arm.

Every Peer may vote by proxy, and may protest against the proceedings of the House.

The House of Lords is an appellate court, but its functions are performed by the Lord Chancellor and one or two lords in rotation. In it, estate and individual bills usually originate, and are referred to the Judges.

Three Peers make a House of Lords. The Chancellor or Speaker, or his Deputy, the Chairman of Committees, and the junior Bishop.—The Chairman of the Committees of Private Bills revises and re-models such bills, and influences the entire legislature.

The King's Title.—Henry the Eighth was the first King of England who assumed the title of Majesty. Before his reign, the Sovereigns were usually addressed "My Liege," and "Your Grace." The latter epithet was originally conferred on Henry the Fourth; "Excellent Grace" was given to Henry the Sixth; "Most High and Mighty Prince," to Edward the Fourth; "Highness" to Henry the Seventh; which last expression, and sometimes "Grace," was used to Henry the

Eighth. About the end of this reign, all titles were absorbed by that of "Majesty," with which Francis the First addressed him at their interview in 1520. James the First coupled to this title the present "Sacred," or "Most Excellent Majesty."

Before the union of the Crowns, Britain alone was in general use, in the style of our Sovereigns, to signify England and Wales. Alfred was called *Basileus*, "Governor of the Christians of Britain;" Edgar, "Monarch of Britain;" Henry the Second, "King of Britain;" and John, "Rex Britanniorum, King of the Britons."

The Royal style, settled on the 5th of November, 1800, on the union with Ireland, which was to commence from the first of January 1801, runs thus:—"George the Third, by the Grace of God, of the United Kingdom of Great Britain and Ireland, King, Defender of the Faith, and of the United Church of England and Ireland, on Earth the Supreme Head."

In Latin, "Georgius Tertius Dei Gratia Britanniarum Rex," &c.

Prince is evidently derived from the Latin word *Princeps*, or Chief.

Duke.—This is a title of honour, or nobility, next below a Prince. It is a Roman dignity; and the first Dukes (*Duces*, leaders) were commanders of armies. Under the latter Emperors, the Governors of provinces were styled *Duces*. When the Goths and Vandals overran the provinces of the Western Empire, they abolished the Roman dignities; but the Franks and others divided all Gaul into Duchies and Counties, and gave the names of Dukes (*Duces*,) or Counts (*Comites*).

In England, during the times of the Saxons, the officers and commanders of armies were called Dukes, after the manner of the Romans. After the Conqueror's time, the title lay dormant till the reign of Edward the Third, who created his son, Edward (first called the Black Prince) Duke of Cornwall.

Marquis, Marquess.—This was introduced into England by Richard the Second, who created Robert Vere (Earl of Oxford) Marquis of Dublin.

Earl.—This is an English title of nobility next below a Marquis, and above a Viscount. Earls were anciently attendants or associates of the King in his Council and warlike expeditions.

Viscount.—This title is used for an order, or dignity, next below an Earl. It was an ancient title as an office, but is a modern one as a dignity, being never mentioned as such before the reign of Henry the Sixth.

Baron is derived from the Latin *Baro*, and those placed next the King in battle were called *Barones*, as being the bravest of the army.

Lord.—This is a general name for a Peer of England, which is also applied to several offices, as Lord Chancellor, Lord Mayor, &c.

There are 650 English baronets, 90 Irish baronets, and 140 Scotch.

The Order of the Garter was instituted in 1350; that of the Thistle was revived in 1687; that of St. Patrick was instituted in 1783; that of the Bath was revived in 1725; and, of this last, there are knights grand crosses; a second class, and a third class, all naval and military; about 750 in the three classes. There is also a new order of St. Michael and St. George, consisting of 44 Ionians and Maltese. There is also a Hanoverian Guelphic order, very liberally distributed.

The business of Parliament is very multifarious—public, general, local, private, personal, and individual.

The privileges of Parliament are of speech, personal freedom from arrest, and of franking letters. Several vexatious privileges were abolished by 10 Geo. III. c. 50.

	Parliaments.
Edward III. had	37
Richard II.	26
Henry IV.	10
Henry V.	11
Henry VI.	22
Edward IV.	5
Henry VII.	8
Henry VIII.	12
Edward VI.	4
Mary	5
Elizabeth	0
James I.	4
Charles I.	3
Cromwell.	4
Charles II.	5
James II.	1
William	4
Anne	5
George I.	2
George II.	5
George III.	14
George IV.	3
William IV. (to 1833)	3

An *Adjournment* of Parliament is the temporary postponement by the House of its meetings usually over a recess. —A *prorogation* is a postponement of both Houses, by royal authority, from one session to another.—A *dissolution* is the civil death of Parliament.

The House of Peers consisted of 421 *Members in* 1832.

5 Princes.	170 Barons.
19 Dukes	16 Scotch.
21 Marquesses	28 Irish.
109 Earls.	26 Bishops.
18 Viscounts.	4 Ditto Irish.

The House of Lords consisted of only 28 peers in 1487; such had been the destruction of the civil wars. In 1510, there were 36. In the reign of Charles II. about 150. In that of George II. about 200.

The Peerage of SCOTLAND elects 16 representatives to the House of Lords; The peers entitled to vote are 74.

There were, in 1825, 219 titles of nobility in IRELAND: 1 duke, 12 marquesses, 81 earls, 48 viscounts, and 73 barons, with 4 peeresses.

The 219 IRISH PEERS elect 28 to the Imperial Parliament; and one archbishop of 4, and 3 bishops of 18 attend in rotation, in a circle of six years.

The Saxon popular assemblies, called Wittenagemots, were virtual Parliaments. Great Councils were held by the early Norman Kings, in which the Kings Tenants, *per capite*, and the Barons assembled. By these councils aids and escuage were granted to the King.

The first Speaker of the House of Commons was Petrus de Mountford. The next were Sir Jeffery Scroope, William Trussell, Sir Henry Beaumont, and Sir Peter de la Mare. The first recorded Speaker was Sir Thomas Hungerford, in 1377. Thomas Chaucer, the son of Chaucer the poet, was three times elected, in 1408, 1414, and 1421.

The Speaker and 40 members constitute a House of Commons.

The salary of the clerk of the Parliaments is 3,300*l*. Of the clerk of the House of Commons is 1,382*l*.—Of the Counsel to committees, 1,582*l*.—and of the clerk assistant, 2,500*l*.

In Scotland the representative system began in 1427, and the Lords and Commons sat together till the Union.

Laws to impose any tax, fee, toll, &c. on the subject must originate in the House of Commons. Other public or private bills may originate in either House. Public bills are brought in, on motion, after notice, and leave given.

The movers get them prepared, and then present them to the House in a skeleton form. The title is then read; this is called *the first reading*. On *the second reading*, the principle of the bill is usually contested, and it is either withdrawn, or thrown out, or referred to a committee for the settlement of the details. In the committee, the bill is debated clause by clause, and amendments are made. The bill is then printed for the use of members. The amendments of private committees are reported to the house for confirmation or disagreement. The bill is then ordered to be engrossed. It is then read a third time. Amendments are made. It is passed, and the title added, or it is thrown out.

When passed in one House, the mover, with other members, carries it up to the bar of the house of lords. The lord chancellor comes down from the woolsack, and receives it with mutual *congees*. It passes through the same forms in the other house. If rejected, no other notice is taken. If passed, or amendments are made, it is sent back to the House of Commons. Any amendments are there again debated. If agreed to, the bill passes to and from. But if disliked, a *conference* is had between the Houses, and the difference is adjusted, or the bill is dropped.

The royal assent is given, 1. By the king. 2. By commission; in old French.

A pardon cannot follow an impeachment by the House of Commons.

On June 4th, 1832, the English Parliamentary Reform Bill passed in the House of Lords, and on June 7th, the royal assent was given by commission. This bill deprived 56 nomination or decayed boroughs of the abused right of returning 112 members to the House of Commons; and it conferred on certain 10*l*. householders the right to vote, besides extending it to large classes of farming tenants, and giving to large new towns the right of returning members. A bill for reforming the still more abused representation of Scotland received the royal assent in July, and another for improving that of Ireland in August. These improvements were consequences of the utter impracticability of carrying on the government by endeavours to satisfy the insatiable and constantly-increasing demands of those who sold their votes and influence.

The Reform Act, 2 Will. IV. recites the expediency of correcting abuses in the representation, by disfranchising inconsiderable boroughs, enfranchising large towns, increasing knights of shires, extending the elective franchise, and diminishing expenses of election.

ELECTION DISTRICTS.—*Sect.* 1.—56 Boroughs to cease to send members.—*Schedule* A.

2.—30 boroughs (ancient) to return one member.—*Schedule* B.

Arundel, Ashburton, Calne, Christchurch, Clitheroe, Dartmouth, Droitwich, Eyre, Great Grimsby, Helstone, Horsham, Hythe, Launceston, Liskeard, Lyme Regis, Malmsbury, Midhurst, Morpeth, Northallerton, Petersfield, Reigate, Rye, St. Ives, Shaftesbury, Thirsk, Wallingford, Wareham, Westbury, Wilton, Woodstock.

3.—22 places, newly-made boroughs, to return two members.—*Schedule* C.

The 22 new boroughs which are to

return two members, are Birmingham, Blackburn, Bolton, Bradford, Brighton, Davenport, Finsbury, Greenwich, Halifax, Lambeth, Leeds, Macclesfield, Manchester, Mary-le-bone, Oldham, Sheffield, Stockport, Stoke on Trent, Strond, Sunderland, Tower Hamlets, and Wolverhampton.

The 22 to return one each, are Ashton, Bury, Chatham, Cheltenham, Dudley, Frome, Gateshead, Huddersfield, Kendal, Kidderminster, Merthyr Tydvil, Rochdale, Salford, S. Shields, Swansea, Tynemouth, Wakefield, Walsall, Warrington, Whitby, Whitehaven, Isle of Wight.

4.—22 other new boroughs, to return one member.—*Schedule* D.

5.—Shoreham, Cricklade, Aylesbury, and East Retford, to include adjacent districts.

6.—Weymouth and Melcomb to return two members jointly. Penryn to include Falmouth; and Sandwich, Deal and Walmer.

7.—The boundaries of these boroughs, except Weymouth and Melcomb, to be settled by the Boundary Act.

8.—11 boroughs in Wales to admit certain other places to share in election.

9.—28 other Welch boroughs to have their boundaries settled.

10.—Swansea, and four other places, one borough.

11.—Returning-officer of new borough, mentioned in schedule, or to be nominated by sheriff, unless charter granted.

Representations.—*Sect.* 12.—Six knights of shire for 3 Ridings of Yorkshire.

13.—4 for 2 divisions of Lincolnshire.

14.—4 for divisions of 25 other counties: Chester, Cornwall, Cumberland, Derby, Devon, Durham, Essex, Gloucester, Hants, Kent, Lancaster, Leicester, Norfolk, Northampton, Northumberland, Notts, Salop, Somerset, Stafford, Suffolk, Surry, Sussex, Warwick, Wilts, and Worcestershire, four instead of two.

15.—3 knights of shire for 7 counties: Berks, Bucks, Cambridge, Dorset, Hereford, Herts, and Oxford, three instead of two.

16.—2 for 3 Welch counties. Carmarthen, Denbigh, and Glamorgan, two instead of one.

17.—Towns, being counties of themselves, included in adjoining counties.

Electors.—*Sect.* 18.—No freeholder (except those now entitled) of estate for life, worth less than 10*l.* a year, to vote for county.

19.—Right of voting for counties extended to copyholders for life, or larger estate in copyhold of 10*l.* per annum.

20.—To leaseholders, of 60 years term, of 10*l.* yearly value, or 20 years term, of 50*l.* yearly value, or actually occupying tenements of at least 50*l.*

21.—Public taxes, &c. not to be considered as decreasing value.

22.—County voters need not be assessed to land-tax.

23.—No trustee or mortgagee, unless in actual possession; but mortgagee or beneficiary to vote.

24.—None to vote in county, for house, &c. conferring vote for a borough.

25.—None for copyhold or leasehold conferring like votes.

26.—But none to vote unless registered, and entitled for 6 months (previously) and as tenant for 12 months, except in cases of descent, &c.

27.—In boroughs, occupiers of houses, &c. of 10*l.* value, for 12 months, registered, and having resided 6 months, and

28.—Occupied same, or other premises, and paid taxes and rates.

29.—Joint occupiers to vote respectively for each 10*l.* of yearly value.

30.—Occupiers may claim to be rated.

31.—Burgage tenants, now entitled for 12 months, and having resided six.

32.—Freemen in borough and liverymen of London, duly registered, to vote, they having resided six months. After March, 1833, no freeman, except by birth or servitude, to vote.

33.—None to vote for city or borough except under the Act, unless a six-months resident, duly registered.

34.—In Cricklade, &c. present freehold voters to retain rights.

35.—In boroughs, none to vote on estate acquired since March, 1831, otherwise than by descent, &c.

36.—None having had parish-relief to be registered.

37.—In counties, overseers of parishes to fix, on 20th June, notice, requiring claims of voters before 20th July.

38.—And on, or before, last day of July, to make list of voters.

39.—Any person thereon may object to another.

40.—Lists, on 20th August, to be delivered to high-constable.

41.—Judges of assize to appoint two barristers to revise lists.

43.—Barristers may insert claims omitted.

45 to 48.—Clerks of livery companies in London to make lists.

49.—Cities and boroughs, C. J. of King's Bench to appoint Barristers.

54.—Register of electors.—List of county voters to be transmitted to clerk of peace, who shall deliver copy in a book to the sheriff.

55.—Overseers to deliver copies to any person applying at reasonable price.

56.—Every elector claimant to pay annually to overseer towards expences

of list. Surplus expence to be defrayed out of poor-rate.

57. Every barrister to be paid 5 guineas per *diem* beside expences!

ELECTIONS. *Sect.* 58.—No inquiry, except as to identity of elector. Continuance of qualification and vote. False answer a misdemeanor—No oath.

59.—Persons excluded by barrister may tender their votes, to be entered separately.

60.—Petitioner, before House of Commons, may impeach correctness of register of votes.

61.—Sheriffs to preside in person or by deputy.

62.—At contested elections, polling to commence at 9 o'clock of the next day, but 2 after the day fixed, unless Saturday or Sunday, and then on Monday. Poll open for 2 days. 7 hours first, 8 hours last day. Counties to be divided into polling districts.

65.—Sheriff to appoint clerks. Books to be sealed on third day. Sheriff to break seals and declare number.

68.—Booths for every 600 electors.

69.—Candidates, or proposers, to bear the expence of booths.

70.—Election laws to remain in force. Penalty on officers misbehaving 500*l*.

A FREEHOLDER MAY VOTE.—1. If he have a freehold of inheritance, however acquired, of 40*s*. yearly value, above charges.

2. If he have a freehold, not of inheritance, but for a life or lives, of the clear yearly value of 40*s*. but under 10*l*.; and he be in occupation thereof.

3. If he have a freehold, not of inheritance, but for a life or lives, of the clear yearly value of 40*s*. but under 10*l*. although he be not in occupation thereof, provided one of the following things exist:—

I. That he possessed the estate before the 7th of June 1832, and possess it at the time of registration and voting.

II. Or, if he did not possess the estate before the 7th of June, provided he had since acquired it by marriage, by will, or in consequence of his coming to some office.

III. Or, provided that the estate be of the clear yearly value of 10*l*.

A COPYHOLDER MAY VOTE.—If his copyhold is of the yearly value of 10*l*.

In all these cases the elector must have been in possession of the estate six months before the last day of July, except in the cases where he may have come into possession by descent, succession, marriage, will, or in consequence of his promotion to an office; in all which cases such six months' possession is not necessary.

A LEASEHOLDER MAY VOTE.—1. If he pay a clear yearly rent of 50*l*.

2. If he hold a lease, originally granted for 20 years, of the clear yearly value of 50*l*.

3. If he hold a lease, originally granted for 60 years, of the clear yearly value of 10*l*.

Actual occupation of premises is requisite to confer the right of voting on an under leaseholder or lessee; but occupation is not necessary in the case of the holder of the original lease.

No person can vote for a county, as a freeholder, or copyholder, or leaseholder, for any house or land which gives him the right of voting for a borough. But every one who has a house or lease, as before stated, which does not give him a vote for a borough, may vote for the county.

In all these cases, the elector must have been in possession 12 months before the last day of July, except in the cases where he may have come into possession by descent, succession, marriage, will, or in consequence of his promotion to an office; in all which cases, such 12 months' possession is not necessary.

According to the Statutes, England and Wales will return 500 members instead of 513; Scotland, 53 instead of 45; and Ireland, 105 instead of 100, making 658 as before.

By the Irish act, Belfast, Dublin University, Limerick, and Waterford will have two instead of one each.

The very imperfect list of electors obtained in the first instance, hold good till November 1, 1833.

Between 1801 and 1831, the British Parliament passed 3,805 general public acts, and about 4,300 local and personal acts. Two-thirds of the whole related to enclosures, roads, bridges, lighting and paving, navigation, docks, piers, rail-ways, &c. for each of which one general act would have answered the purposes, but a corrupt system rendered it expedient to extort fees on each, by which this profusion of legislation has lost the country at least five millions.

In 1830, the petitions presented were 11,403, chiefly in favour of reform.

The longest sessions of parliament in this century was 270 days, in 1803; 266 in 1811; and 268 in 1814; and the sitting days respectively 146, 135, and 127, of seven or eight hours each. The greatest attendances were 608, March 22, 1831, on the Reform Bill; 603, July 6, on same; and, 553, March 6, 1827, on the Catholic Bill.

The printing and stationery, per sessions, cost of late from 00 to 100,000*l*. and the stationery for the public offices cost, in 1831, 106,856*l*. In 1826, the whole cost 240,000*l*.

The acts of UNION are those of 27

Hen. VIII. c. 26, uniting Wales to England—5 Ann, c. 8, uniting Scotland to England and Wales—and 40 Geo. III. c. 67, uniting Ireland to Great Britain.

The Habeas Corpus Act is the 31st Car. II. c. 2. The cause of its introduction was the arbitrary imprisonment of Francis Jenks, a patriotic city linen-draper. Under it, on complaint of any prisoner, (except for treason or felony) any chancellor or judge must award the writ to bring up the defendant, and bail him, if bailable.

Patents are taken out under the statute 21st Jas. I. c. 3. The term is 14 years. The cost of a patent specification is between 100*l.* and 200*l.*

The Acts relating to copyrights are:

Books, 54th Geo. III. c. 156. Duration 28 years, and if the author survive, during his life.

Engravings, 7th Geo. III. c. 38., for 28 years.

Sculpture, 54th Geo. III. c. 56., for 14 years.

Linen patterns, 34th Geo. III. c. 23., for 3 months.

The crown has the copyright of the Bible and Common Prayer-book, the Statutes, and some old latin books.

Authors required, for their encouragement, a quick reversion, and 14 years were fixed by the statute of Anne; but a Gotham parliament, in 1814, extended the reversion to 28 years, under pretence of better service to them! Such a case of absurd legislation never, perhaps, disgraced any country. It was a trick played with success, by the bookselling assignees, who wished 28 years instead of 14, in utter disregard of the interests of authors.

In 1720, when the South-Sea Company obtained their monopoly, they procured the passing of the Bubble Act, 6th Geo. I. c. 18., against mischievous projects, undertakings, &c. which were then very numerous. This, after lying dormant for a century, was called into activity, in 1812, but was repealed by the statute 6th Geo. 4. c. 91. In those years of consequent speculation, 1824 and 1825, there were of joint stock companies:—

Established	127
Abandoned	118
Projected	379
	624

The earliest *Usury Act* is the Stat. de Judaismo, Edw. I., by which all usury was prohibited, and by 3d Hen. VII. all dry bargains, usury, and chevisance were prohibited. The 37th Hen. VIII. c. 9. repeals all preceding laws, and annuls all bargains for larger interest than 10 per cent. The 5th and 6th Edw. VI. c. 20. prohibited all usury whatever. By the 13th Eliz. c. 8. against the "vice of usury," the act of Edw. VI. was repealed, and 10 per cent interest was again allowed. The 21st Jas. I. c. 27. also "against usury," reduces interest to 8, not, however, allowing usury "in point of conscience." The 12th Cha. II. c. 13. "against excessive usury," reduced interest to 6. The 12th Ann, c. 16., reduced it to 5 per cent. leaving spiritual views out of the question. By the 14th Geo. III. c. 79. repealed by 3d Geo. IV. c. 47. which supplied its provisions, the Irish and Colonial rate of interest is there allowed to be taken.

The most remarkable *Agricultural Laws* are the following:—

Stat. 51st Hen. III., 28th Edw. I. c. 12. Beasts of the plough not to be distrained, if there are others.

3d Hen. VI. c. 2. Sheep shall not be transported without licence.

4th Hen. VII. For the repopulation of the Isle of Wight, then desolate by reason of the increase of pasturage, enacted that no person should hold 2 farms, the rent whereof exceeded 10 marks (0*l.* 13*s.* 4*d.*) yearly, under the penalty of 10*l.*

4th Hen. VII. c. 19. To avoid the enormity of houses and towns, late in tillage, being laid to pasture, and made desolate, so that where 200 late lived only two or three herdmen now live, husbandry is decayed, and churches are neglected; enacted that the owners of houses, with farms of 20 acres, shall be bound to maintain the same houses and farms, under the penalty of the forfeiture of the profit to the king. This statute is highly commended by lord Bacon.

6th Hen. VIII. c. 5. Whoever suffers a house of husbandry to decay, or converts tillage into pasturage, shall be subject to a forfeiture of half the profits to the lord of the fee.

7th Hen. VIII. c. 1. The penalty under the former statutes was increased to a forfeiture of half the land.

25th Hen. VIII. c. 12. To restrain the keeping of inordinate numbers of sheep.

5th and 6th Edw. VI. Land made pasturage since the time of Hen. VIII. to be restored to tillage.

5th Eliz. c. 2. Former acts, touching husbandry, to be put in execution.

31st Eliz. c. 7. To prevent the building of cottages, without each having 4 acres of land, under 40*s.* per month.

Two Acts 30th Elizabeth, brought in by Sir Francis Bacon. By one, the statutes of 4th Hen. VII. and other statutes, made against the destruction of houses in husbandry, was repealed. The other

enacted, that arable land made pasture since the first year of that reign, should be reconverted to tillage, and lands then arable should not be made pasture. The Acts were temporary, and expired. (1 Parliamentary Hist. 899.)

In the 21st Jas. I. c. 28. The former statutes, relating to husbandry, were repealed.

By the law, property is divided into two kinds, as lands, tithes, &c. called real; and money, stock, goods, &c. called personal.

In England, a male of 12 may take the oath of allegiance; at 14, may consent to marriage, or choose a guardian, or make a will; at 17, may be an executor; and, at 21, is of age. A female, at 12, may consent to n marriage; at 14, may choose a guardian; at 17, may be an executrix; and, at 21, is of age.

CORPORATE TOWNS are governed by a mayor and town-clerk, from 6 to 24 aldermen, and from 20 to 30 common-councilmen. They have also a recorder, and about 20 clerks and officers, besides goaler, trumpeter, &c. In general, they fill up vacancies by close election; and a few are more or less open to the citizens or burgesses. Their estates, and their immunities from tolls, fees, fines, &c. are often very considerable, and sometimes made useful to the public. They originated in the policy of kings, to render themselves independent of the local barons; and, therefore, the early charters are more popular than the later ones granted in the reigns of Charles and James.

The Court of *Piepoudre* is formed at all fairs, by the steward, for summary redress of wrongs in the fair.

No person can be arrested in a fair except for debts contracted there, or promised there to be paid. This is ancient law, opposed to the turpitude of modern legislation.

The number of barristers, in 1831, was 1,132, whose fees constitute 5 per cent. of the whole expences of law-suits; conveyancers and pleaders, 132; London attorneys, 4,342; country attorneys, 2,742; total number of lawyers in England and Wales, 13,348, being 453 more than there were on the 1st of January, 1830. For the 10 years ending 1830, the attorneys paid in duties on articles of clerkship, admissions, and yearly certificates, nearly 100,000*l.* sterling.

The most intelligible division of actions is into those which arise from contract, and those which are given for an injury; but actions are technically distributed into several forms:—

Assumpsit, comprehends nearly 180 cases of contracts, or undertakings.

Case, comprehends nearly 100 complaints of injuries, six of persons or property, disturbances or rights, criminal conversation, seduction.

Covenant, which lies only on contracts under seal, and is usually applied to about 40 cases.

Debt, chiefly brought on bonds, and other specialties.

Detinue, for unlawfully detaining goods, &c. lent. Now seldom used.

Ejectment, in which, by an ingenious conversion, the title and possession to all estates in lands is now usually tried and recovered; and the pleadings in which at present disclose no information, and have little variety.

Libel, or slander.

Quare Impedit, for the disturbance of church patronage.

Replevin, to recover damages for an illegal distress.

Trespass, which comprehends about 40 cases of violent injury to person or property—as false imprisonment.

Waste, or spoil, committed by a tenant for life, or years, on the inheritance.

By an Act 1st Will. IV. it was enacted that Hilary term should begin on the 11th, and end on the 31st January. Easter on the 15th April, and end on 8th May. Trinity on 22nd May, and end June 12; and Michaelmas on Nov. 2, and end Nov. 25.

Peele's Acts, 7th and 8th Geo. IV. c. 27. repealed nearly all previous penal statutes, and cap. 28, 29, 30, and 31, Lansdowne's Act, 9th Geo. IV. consolidated the whole, with some alteration and a few ameliorations.

Peele's Jury Bill, is 6th Geo. IV.

Brougham's Bankruptcy Act, is 1st and 2d Will. IV.

Mackintosh's Forgery Act, is 2d Will. IV.

The Customs and Excise Consolidation Acts, are 6th Geo. IV.

The General Turnpike Act, is 3d Geo. IV.

The General Highway Act, is 17th Geo. III.

The persons liable to the Bankrupt laws are,—all buyers, sellers, letters for hire, and dealers in trade, but not those in agriculture.

The waste of property, under commissions, is two-thirds as to the bankrupt, and 10*s.* in the pound as to the creditors, who on the average do not, in long time, get above 2*s.* or 3*s.* The law, &c. gets more than the creditors, &c. therefore the lawyers in parliament will not permit any law to pass to enable any possible majority of creditors to adjust with the debtor. No adjustment is permitted, though 90 of 100 creditors agree to it; hence, the

law is enabled to get a million per annum from bankruptcy, while the creditors lose five or six millions, and the bankrupts nine or ten millions. The value of a reformed parliament may be estimated by its conduct, in regard to this nefarious system.

By the statutes of the 9th and 13th of William III., it is enacted, that submissions to arbitration may be a rule of any of the courts of record, and equivalent in force to the decision of a jury. These statutes are, however, unavailing, owing to barristers being often made arbiters, by which a decision is made according to law, and not according to equity.—*Gazelee*.

The Essoign-day is the first day of every term; but usage concedes three days as essoign or excuse.

Prothonotaries are officers for recording the proceedings or decisions of courts of law.

A solicitor is properly only an attorney, who conducts suits in equity.

There are, in England and Wales, 5,371 acting justices of the peace; of whom 1,354 are clergymen. In Derbyshire and Sussex there are none of this class; and, in Kent, but two of 145. In other counties they are half or two-thirds, to the great annoyance of the people, and the prejudice of the church.

Twelve persons, assembled for an unlawful purpose, constitute a riotous assembly.

The *Posse Commitatus* is the whole male population, called out by the sheriff or two justices; and all not attending are liable to be imprisoned.

Torture was osed in England previously to the Commnnwealth. The Tudors were partial to it, and the conspirators of gunpowder-plot were racked. Lord Bacon and Sir E. Coke signed many warrants to pnt men to the torture, and the last case was under Land, in 1640. The *rack* was a frame, in which the prisoner was suspended horizontally by the wrists and ancles, and stretched. The *Scavenger's Daughter* was a compressing hoop, embracing the doubled body. *Manacles* were iron gnantlets, contracted by a screw. *Little Ease* was a cell, too small to move or exist in. These instruments are abolished; but torture, sanctioned by law and custom, still exists in a hundred forms.

A Hindoo jury, agreeable to ancient custom, consists of five persons, chosen from among the elders; two by the plaintiff, two by the defendant, and the fifth by the administrator of justice.

Wills of personal property require to be proved in the proper ecclesiastical conrt. The inspection, or custody of the Wills of the deceased, have from a very remote period, perhaps since Richard II.'s reign, been procured by the ecclesiastical courts or judges. They at first got an inspection to see whether there were any legacies left to the church, or directions respecting burials, &c.; they then took copies, or transcripts, and finally kept the original, and sold copies.

Thus the transcripts in Doctors Commons commence in 1383, the originals not before 1505. At York they only go back to 1600. The calendars of reference go back as far as the transcripts, but they are worn in some places illegible. A sight of a transcript of any will may be had at Doctors Commons for 1*s*., but nothing must be extracted from it, or compared with it, without paying for a copy or extract.

Under the Act of 11th Geo. IV. and 1st Will. IV. c. 70, several rules of court have been made by the judges, to render practice uniform; but these, in several cases, are so oppressive and insulting, as to demand the early interference of parliament.

In chancellor More's time, from 1529 to 1532, there were 133 snits per annum. In Jas. I.'s reign they averaged 1500 per annum, and under lord Bacon 1461. In chancellor Nottingham's time 1650. In lord Hardwicke's 2000, and latterly they have been from 1500 to 2000. From 1749 to 1751, the number of equity decisions made by lord Hardwicke was 1264, and from 1808 to 1810, under lord Eldon, but 962.

The *Common Law* commissinners have proposed the abolition of all obsolete actions, wagers of law, the consolidation of trespass and trover, the alteration of ejectment to plea of land, and that courts of law may grant prohibitions in waste, regulations to prevent sham pleas and demurrers, &c. with some amendments in the law of juries.

The *Ecclesiastical* commissioners have recommended the abolition of all inferior ecclesiastical coorts, and the extensinn of the jurisdiction of those of Doctors Commons, to wills of real property. They are there opposed to the real property commissioners.

What puny propositions, and how incommensurable with the intelligence of the age, and the demands of the public. But, how grossly absurd it is to expect that lawyers will so reform the law as to relieve the public from the oppressions by which their brethren profit!

There are aboot 40 public general acts relating to the relief and employment of the poor, and nearly 1000 local poor acts. The series commenced 43d Eliz. and continues down to the present

time. About the same number of acts treat of the poor-rate.

The bench of judges, in the celebrated ship-money case of Hampden, consisted of Branston, C. J. and Davenport, C. B. who were for Hampden, on technical grounds, bnt against him on the question of prerogative. J. Croke, Hutton, and Denham, were for Hampden, and against the prerogative. Finch, C. J. afterwards lord-keeper, the active solicitor for the king, Trevor, Weston, Vernon, Crawley, Berkeley, and Jones, were against Hampden, and for the prerogative; and the whole 12 joined in the certificate against him.

The star-chamber was opened 3d Hen. VII. and abolished 16th Car. I.

In the year ending Oct. 1826, there were 2,487 bankrupts, and 12,097 debtors discharged from the London prisons only, and as many more from the country prisons, paying at most 1*s*. in the pound, with a gain to the law of half a million on bankruptcies, and, from others, of another half million; and a loss to creditors of at least 30 millions.

In 1831, there were 1,364 bankruptcies, of whom, 629 in London, 66 in Liverpool, and 63 in Manchester, and there were 68 merchants, 32 builders, 28 cotton spinners, 28 printers and booksellers, and 12 bankers. The compositions, &c. were about 10 times the number of bankruptcies.

In 13 years, from 1817 to 1829, there were 20,000 bankruptcies gazetted, an average of 900 for 8 years; but, since 1826, averaging 2,400, at a cost of 300*l*. each, or 3-4ths of a million per annum.

In 1828, 16,588 processes for debt were issued in Middlesex by writ.

In 1829, 4,063 persons were discharged by the Insolvent Debtors' Court. What another picture of society! There were, also, 1,654 English bankrupts, and 190 declarations of insolvency.

The Debtors sent to the London Gaols, in 1829, *were*:—

King's Bench	1527
Fleet	615
Whitecross-street	1771
Marshalsea	379
Southwark	309
By Courts of Requests	2495

That is, 7114 persons imprisoned in one year, in London only, from inability to pay debts, chiefly owing to parliamentary speculations on the currency, and no relief being afforded.

Moreover, 4,029 were arrested, in London, on mesne process; and 683 in execution. In Middlesex, 11,648 arrests; 2,403 in execution. In Southwark, 2,746 arrests; and 571 in execution. In all, 22,079. Perhaps 10 times the number in England and Wales; and 3,646 in Scotland; besides 8,943 executions.

The number of debtors per annum, received in the King's Bench, were, in 1820, 1,780; in 1821, 1,701; in 1822, 1,802; in 1823, 1,519; in 1824, 1,486; in 1825, 1,608; in 1826, 1,893. Altogether nearly 12,000, from whom the system of arrest extracted, at least, 2*s*. 6*d*. in the pound, while, in most cases, the creditors did not get a penny in the pound.

In London there are, as debtors' prisons, the King's Bench, Fleet, the County and City Debtors' Prison, and Horsemonger-lane. In other districts, debtors are put in the common goals.

The King's Bench has 192 rooms, the Fleet about 100; but the city prison is in common wards, and most disgraceful. The two first have rules or districts out of the prison, with security. The other has none.

Since 1814, there have been relieved, in 16 years, 4,000 per annum by the Insolvent Debtors' Court.—Debtors would pay, but the law prevents them, by thwarting arrangements.

Latterly, arrests in mesne process, or before the end of the suit, have been limited to sums above 20*l*.; and, by special original, above 100*l*.

By parliamentary returns, it appears that, in the 18 months subsequent to the panic of December, 1825, 101,000 writs for debt were issued: 71,000 by the King's Bench, 23,000 by the Common Pleas, and 7,500 by the oppressive Marshalsea-court; of which 56,000 were on bills of exchange and promissory notes. In the meantime, the legislature coolly looked on, and new rules of court accelerated the proceedings.

In 7 years, from 1820 to 1826, there were 13.379 causes in the King's Bench. 3,902 in the Common Pleas, and 1,346 in the Exchequer; or 2,650 per annum, at a cost of 200*l*. on the average, or half a million per annum. Chancery, local jurisdictions, and criminal causes would be each as much more, or full two millions per annum.

Owing to the illiberality and overcunning of the laws against debtors, above 30 millions of debts have been cancelled within 14 years, for less than one farthing in the pound to the creditors, in the Insolvent Debtor's Court. The attornies were, however, paid in full.

It was computed, that the stoppage of commercial credit in December, 1825, and of 1*l*. notes in 1829, raised the value of money two-thirds; and sunk the value of all stocks in an equal proportion. Yet no variation was made in the assessment of taxes, nor modification in the laws between debtor and creditor.

Magna Charta demanded witnesses

to justify process *before trial:* and, since Edward III., the fictitious names of *John Doe* and *Richard Roe* are put into writs, as pretended witnesses! By Tenterden's Rules of Court this little sign of security has been withdrawn.

The writs issued in chancery are those which relate to the crown, which used to be kept in a *little bag;* and those relative to the subject kept in a *hamper;* and hence the hanaper-office and petty-bag-office.

New acts of Parliament used to be sold at three-pence per sheet of 2,400 words, but there is now a cheap edition of 0,600 words at two-pence, printed as the acts pass.

The official costs of a patent in England are 107*l.*; Scotland, 80*l.*; Ireland, 123*l.* There were, in 1830, 1,855 patents in operation. The annual numbers in England are 152; in France, 182; and, in Austria, 183.

De facto is applied to actual possession, and *de jure* to right.

The term BORNUGH is derived from *Burg*, synonymous to castle, around which, for security, towns grew. Charters were granted by kings to render the inhabitants independent of their castellated lords; and these corporations were then recognized as fit to send representatives to the wittenagemot and parliament.

EDINBURGH is governed by a lord-provost, 4 bailies, a dean, treasurer, deacon, 3 assessors, and a chamberlain.

The Executive Government of IRELAND resembles that of England, with a privy-council of 57, and officers of state, clerks, &c. &c.

DUBLIN is governed by a lord-mayor, 24 aldermen, and 2 sheriffs; with a recorder and 2 town-clerks.

The ISLE of MAN has a governor, deputy, courts of law, house of keys, (council,) attorney-general, &c.

A heriot comes from the Saxon, heregeat, tribute of weapons.

Titles, customs, &c. are, in law, immemorial, when before Edward II., or 1340. The period of legal memory was the return of Richard I. from the Crusades. A new law makes it 60 or 40 years.

By the custom of gavel-kind, in parts of Kent, an estate is divided among all the sons; and that of an intestate brother, among his brothers.

Fee-farm-rent is a composition paid by a whole borough, or town, to the lord, in lieu of individual claims; and this arrangement produced free boroughs, and their representation. Middlesex pays to this day, by the sheriffs, a fee-farm rent of 300*l.* per annum.

Estrays are animals found at large, without owner; and waifs are stolen property, left by felons: both belong to the lord of the manor.

Quit-rent is so called from *white*-rent, being to be paid in silver; which, in other rents, were paid in kind.

Bail is security to appear and answer to some accusation; and, by an abuse of law, is in England exacted for claims of debt, but restricted to sums above 20*l.* The vexations of the system render it a source of intolerable oppression. The law refuses bail on sworn charges for treason, murder, manslaughter, felony, and outlawry. Excessive bail is forbidden.

Evelyn relates that, in 1640, culprits were beheaded at Venice and Naples with a machine, like the guillotine.

In 1817, it appeared, that, for the last five years, there had been transported 3,988 males, and 671 females; and, of the former, 980 were under 21 years of age; and, of the latter, 136.

The three city prisons cost the City of London full 20,000*l.* per annum.

3,393 male convicts were sent, in 1827, to New South Wales.

In five years, from 1812 to 1817, two children, 11 years old, were transported; 7, of 12; 17, of 13; 32, of 14; and 66, of 16.

About 600 prisoners are confined in the Penitentiary, at Milbank.

The executions for forgery were, in 1820, 20; in 1821, 16; in 1828, 4; and, in 1829, 7. In 1820, 18 were for bank-notes; and, in 1821, 13. There have been 64 executions in ten years.

The dear corn years, from 1809 to 1818, swelled the list of crimes from 5,350, in 1809, to 14,254, in 1818.

In 1829, there were committed to Newgate 387 male, and 39 female children, under 17 years of age; and 924 males, and 627 females, above that age. Of these, 27 were hanged; 1,084 transported; 609 tried and acquitted; and 308 not indicted; and 354 were in custody, Jan. 1, 1830. The crimes were, 1 murder, 12 forgeries, and 1,645 larcenies; and 131 sentences of death.

On June 1, 1830, there had been established of the new police, or gens-d'-armes, in and round London, no less than 3,314 persons; 17 superintendants, with salaries of 200*l.*; 68 inspectors, at 100*l.*; 323 serjeants, at 22*s.* 6*d.*, and clothing; and 2,906 patrols, at 10*s.*, and clothing. The gens-d'-armes, in Paris, are about 800; and, throughout France, 10,000. The alguazils of the Inquisition, in Spain, amount to 12,000.

From 1740 to 1756, 306 culprits were executed in London; in the next seven years, 130; and the following seven years, 233. In the century abovenamed, 30 per annum; but, in 1807-8, in the shrievalty of Sir R. Phillips, there was

no execution. In the bloody reign of Henry VIII., 72,000 were executed in England and Wales, for civil, political, and religious offences.

There were 4,446 convicts maintained in England; and 1,368 in Bermuda, in 1829. And there were, in that year, 3,202 men, and 696 women, sent to New-South Wales; besides 1,236 men, and 198 women, to Van Diemen's Land; 5,422 in all: besides those in England and at Bermuda. What a picture of society!

During the second 10 years of Geo. III. the capital punishments, in London, savoured of butchery. Every six weeks there used to be a public procession, from Newgate to Tyburn, of from 8 to 15 and 20 criminals, chiefly youths; and, at the drop of the Old Bailey, the executions used to be likened to the suspension of lbs. of candles, 15 or 20 at a time! The number in London is now about 18 per annum.

Crimes have increased, in an inverse proportion, to the price paid for labour; the number of commitments in England and Wales being:—

In 1800	3,300	In 1818	13,567
1805	4,605	1819	14,254
1806	4,346	1820	13,710
1807	4,446	1821	13,115
1808	4,735	1822	12,241
1809	5,350	1823	12,263
1810	5,146	1824	13,698
1811	5,337	1825	14,437
1812	6,576	1826	16,164
1813	7,164	1827	17,121
1814	6,390	1828	16,564
1815	7,898	1829	18,675
1816	9,091	1830	18,107
1817	13,932		

The punishment of the gallies in France, &c. is cruel, insulting, and disgraceful to humanity. The victims are chained by the neck to a main chain, which unites thirty, and few ever disengage themselves till suicide, disease, or crimes worthy death, relieve them. Their place of confinement and labour, at Toulon, is called the Bagne.

The situation of convicts in New South Wales is so horrible, that jurors ought not lightly to convict, as merely implying transportation.

The convicted, from 1824 to 1830 inclusive, were	80,882
The acquitted, in same term	22,320
No bills found, and not prosecuted	12,387
Total commitments in 7 years	115,569

Executioners were called Duns after the Restoration, and the name Jack Ketch arose from a fellow so called before the Revolution.

Since 1821, when the one-pound Bank of England notes were withdrawn, there have been but seven cases of commitments for possession of forged notes; but, in the five previous years, there were 923 commitments for this offence.

Sentences of death have increased from 282 and 268, in 1805-6, to 1,456 and 1,311, in 1827 and 1829.

Acquittals after bills found, on an average of years, are about one-fifth. In one case in six or seven, no bill is found after commitment.

The greatest number of executions in 30 years were, 115 in 1817, and 114 in 1821; the least, 39, in 1808; and 45, in 1811.

245 executions at Newgate took place in 11 years, from 1816 to 1826.

The greatest number of commitments for murder, in 20 years last, were 87 in each of the two years, 1811 and 1813; 85, in 1816; and 80, in 1814 and in 1817; in 1822, 85; 1825, 94; and in 1828, 83. About half were executed.

The commitments for crime, in 1830, were 18,107, of whom 12,805 were convicted, and 46 executed.

The commitments under the game-laws, for seven years, have varied from 250 to 400 per annum.

From 1688 to 1718, two-thirds of the capitally convicted were executed. From 1755 to 1784, a third; and from 1784 to 1814, one-fourth. Latterly, only an eighth. Convictions for forgery are four-sevenths of the commitments. One-third committed for all crimes are not convicted.

In 1830, 1,397 persons received sentence of death, but only 46 were executed.

The commitments for crimes, in 1831, in Ireland, were 9,902, of whom 262 were capitally convicted, and 39 executed.

The right of Gleaning is founded on the express injunction of the Mosaic law, which Jesus declared he came to fulfil and enforce.

The COURTS OF LAW, in Scotland, consist of the Court of Session, of Justiciary, the Exchequer, Civil Jury Court, the Admiralty, the Chancery, the Signet-office, the Lord Register's, and the Consistorial Court.

271 new peers have been created since 1700, of whom, the Pitt administration created 90, and the Liverpool 50. But, from 1260 to 1760, only 138 were created, of whom 56 were from the Revolution to 1760.

The Ionian Islands are, in a diplomatic sense, an independent republic, with a president; but controlled by a British commissioner, sustained by British forces.

In India and China the property of

the soil is in him who occupies and tills it, allowing 10 per cent. to the government for legal protection.

Trial by various ordeals still prevails in many parts of India, and among superstitious people often detects guilt by fear or fright.

The operative laws of China, or those of the present *Tatsing* dynasty, called *Leu-lee*, were translated by Staunton. They little accord with the spirit of their moral code.

The ministers of the Grand Seignior are, the Grand Vizier, his Lieutenant, the Kaimakam, the Mufti, the Capitan Pacha, the Reis Effendi, the Kiaja Bey, the Defterdar, or Treasurer, the Seras-quier, and the Dragoman, or Interpreter.

By a report from the Minister of Criminal Justice in France, for 1829, it appears that out of 7373 accused persons in custody, 4523 could neither read nor write; 1947 could read and write imperfectly, 729 could read and write well, and 170 had received a superior education. Out of the 7373 accused persons committed, 2808 were acquitted, and 4,475 condemned, namely—89 to death, 1353 to hard labour, 1222 to solitary confinement, 1 to the pillory, 2 to degradation, 3 to banishment, and 1825 to correctional punishment.

The *Juges de Paix*, or Justices of the Peace, in France, amount to several thousand, and are chiefly lawyers, with small salaries. They decide petty cases of property, besides keeping the peace, and, in other respects, their functions resemble those of the English Justice of the Peace; with this incalculable and exemplary advantage, that no action can be maintained in any court till the *Juge de Paix* has certified that he has heard the parties, and finds it impossible to reconcile the difference.

By the salique law, in France, no female can succeed to the throne.

In France, in 1826, the number of committals, in a population of 32 millions, was 6988, of whom 4348 were convicted. In England, in the same year, it was 16,164 on a population of 12 millions.

The maxims of civil government ought not to be founded on any theory of abstract rights, or on any *à priori* claims or positions, but on public utility, as pointed out by experience, and the result of past facts.—*Cooper.*

Laws are enacted not for the benefit of rulers, but with a view to promote the greatest good of the greatest number.—*Priestley.*

The Law of Nations is merely a theory of ingenious writers, and seldom quoted, except to justify some enormity.—*Cooper.*

LONDON.

London covers 32 square miles with streets and houses from four to five stories high, from the basement, containing from 6 to 20 rooms each, 185,000 in number, with about 1,450,000 inhabitants. It divides itself into City, vast Suburbs eastward, and vast Suburbs westward, besides Districts north, and Southwark south. In another sense, it is a great Port to the east, a vast trading Town in the centre, and the superb Seat of the court at the west end. Either division is larger than any other city in Europe, and twice as large as any other town in the United Kingdom. It is from 24 to 25 miles round.

The number of houses in London, in 1801, was 121,189, but they increased 20,000 in each ten years; being, in 1821, 164,948; and 1831 about 185,000. In the out-parishes, the increase in Hammersmith in twenty years, from 1801 to 1821, was 535 on 871. At Hampton, 300 on 290. At Hampstead, 386 on 601. At Stoke Newington, from 208 to 398. Tottenham, 598 to 976. Edmonton, 901 to 1334. Bromley, 256 to 842; and West Ham, 1081 to 1722. Such were the facilities of mortgage to builders, afforded by a paper circulation.

In 1830, 130,000 houses were let at rents from 10*l.* to 400*l.* and upwards, in London north of the Thames, and 20,000 south of the Thames. Total rentals, six millions. 109,000 were assessed at above eight windows.

One-third of the houses in N. London are rated below 10*l.* The number assessed in 1830 was 116,279, at rentals of 5,143,340*l.*, probably one-third below the real amounts. The assessments for windows above seven, were on 89,808 houses, north of the Thames.

In London 53, in Westminster 277, and in Marylebone, 77 houses are assessed at rentals of 400*l.* and upwards; and from 3 to 400*l.*, there are in London 75, in Westminster 220, and in Marylebone, 164. The totals for Middlesex of these large premises, are 419 above 400*l.*, and 487 from 3 to 400*l.*

In London, 27 houses are assessed for above 100 windows, 59 in Westminster, and 35 others in Middlesex. From 75 to 100 windows, there are 208 in the district.

All England and Wales give but 19 other houses rated at above 400*l.*; and only 51 from 300 to 400*l.*, more than the metropolis in Middlesex and Surrey.

London pays five-eighths of the house duties, and one-third of the window duties, of all England and Wales.

The city of London, in 97 parishes,

within the walls, contained, in 1831, 55,778; and, in 1801, 63,832 persons.

The 14 parishes immediately without the walls, contained, in 1831, 67,480; and, in 1801, 65,696.

The 11 parishes of Westminster contained 202,050, in 1831; and, in 1801, 153,272.

The other 10 parishes, within the bills of mortality, 266,199, in 1831; and in 1801, 137,655.

Making a total, within the bills, of 1,180,975, in 1831; and 746,953, in 1801.

Marylebone, Pancras, Paddington, Chelsea, and Kensington, in 1831, were 273,587; and, in 1801, 117,802.

Within the bills . . .	1,180,975
Without the bills . .	273,587
Total Population	1,454,562

The following Parishes also adjoin London, in regular continuity of streets, and contained, in 1831:—

Hammersmith	10,222
Hampstead	8,588
Highgate	4,856
Stoke Newington	3,480
Bromley	4,846
Stratford	3,371
West Ham and Stratford	11,580
Deptford	13,759
Ditto	6,036
Greenwich	24,553
Camberwell	28,231
Clapham	9,958
	129,480
Adding, as above	1,454,562
London, in 1831	1,584,042

Besides, a dozen other places in close juxtaposition, but not actually joined by continuous buildings.

Pigot's very complete London Directory contains 1203 columns of classed names of trading and professional persons, and firms, 64 in a column, or the astonishing number of 76,992 establishments of trade or industry, of various magnitudes. The alphabetical list contains 404 names and firms in 171½ pages, making 69,286.

If we suppose that each maintains 10 men, women, and children, we have in this astonishing list alone, the support of 769,930 of the inhabitants of this vast metropolis.

Then follow lists of

45 Insurance Companies.
9 Water-works.
17 Gas-light.
28 Mining Companies.
30 Trading, and Miscellaneous.

In all, 129; each of which employs on the average 50 persons, or other, 6450 providing for four times the number, or full 30,000 more.

Besides the Bank, India House, Post Office, Excise Office, Custom House, Somerset House, and the Treasury, another 30,000.

There are likewise ten closely-printed pages, in three columns, of public establishments.

303 Churches and chapels of the Established Church.
22 Chapels for foreigners.
364 Chapels for various dissenters, catholics, and jews.
689 Religious places.
150 Various institutions.
250 Public schools.
150 Hospitals, infirmaries, &c.
156 Alms-houses, work-houses, &c.
550 Public offices, &c.
22 Courts of Justice; among which, we find the Star Chamber.
6 Courts of Request.
16 Police-offices.
14 Prisons.
31 Exhibitions, &c.
22 Theatres.
26 Club-houses.
12 Barracks.
46 Livery-companies halls.
3 Other companies.
24 Markets.

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Which, on the average, provide for 50 each, or another 100,000 of the population.

By the same matter-of-fact authority, there appear to be no less than 13,936 separate streets, squares, courts, alleys, &c. having distinct names.

The most striking circumstance in the list of employments, is the number of 2280 attorneys, and 1176 barristers and special pleaders, besides 105 conveyancers, let loose on society, by the gross negligence of the legislature, with no restraint but a lawyer's conscience. The next prominent numbers, and equally ulcers of society, are the 4368 public-houses, besides 380 hotels and inns, 470 beer shops, and 960 spirit and wine shops. Can it be wondered, that London, in spite of apparent advantages, and specious display, is nevertheless, really the most unhappy and vicious place in the world.

Trades and Employments in London.

Boys' Schools	567
Girls' Schools	992
Attorneys	2280
Sheriff's Officers	32
Architects	270
Artists	400
Bakers	1948
Banks	71
Barristers & Special Pleaders	1176
Bookbinders	340
Booksellers	716
Boot and Shoe Makers	1856
Master Bricklayers	704
Stock Brokers	320

Builders	320
Cabinet Makers & Upholsterers	768
Carpenters (Master)	1472
Chemists and Druggists	440
Circulating Libraries	178
Coach Makers, &c.	512
Conveyancers	105
Dentists	128
Engineers	132
Engravers	576
Furniture Brokers	704
Grocers	1600
Goldsmiths, Jewellers, and Lapidaries	896
Hotels and Inns	380
Hucksters, General Shop-keepers	2349
Law Stationers	136
Lightermen	190
Linen Drapers	704
Merchants	1800
Music Sellers and Instrument Makers	320
Opticians	104
Organ Builders	25
Pawnbrokers	288
Physicians	230
Picture Dealers and Cleaners	74
Printers and Joiners	480
Proctors and Notaries	150
Public Houses	4308
Beer Shops	470
Sculptors	57
Silk Trades	384
Stationers, whole and retail	630
Surgeons, &c.	1411
Surveyors	148
Teachers of Languages	560
Tailors (Master)	2508
Tobacco and Snuff Dealers	704
Wine and Spirit Dealers	960
Watch Trades	864

Boyle's very correct Court Guide, for the current year, gives a list of about 10,000 private families resident in the squares and fashionable streets. It includes the professions, and also merchants, &c. from the city, and considering these as half, it will appear that 5,000 persons of rank and fortune reside in and round London, whose incomes must average 800*l.* per annum, judging from their general style of living.

There are 1,342 chambers in the Inns of Court, in London; 1,243 in the colleges of Oxford; and 1,065 in Cambridge.

The religions of London may be partly estimated by the numbers of buildings devoted to each,—303 Church of England, 6 French, 7 German, 2 Swiss, 2 Dutch, 7 Welsh, 1 Bavarian, Armenian, Irish, Russian, and Swedish.

There are also 3 Arians, 11 Unitarians, 77 Baptists, 124 Independents, &c., 6 Lady Huntingdon's, 56 Methodists, 14 Scotch Presbyterians, 4 Swedenborgians, 8 Quakers, 21 Catholic, 11 Synagogues, 2 Moravians, 2 Free-thinkers, 2 Deists, 3 Huntingtonians, 3 Bethel Unions, 1 New Jerusalems. In all nearly 700, and if we assign to each 300 persons, or at twice per day 400, we get $400 \times 700 = 280,000$, who are religious, out of a population of a million, above six years of age. In age and sex, they may be divided into 100,000 children, 120,000 females, and about 60,000 men.

About 100,000 may, too, be considered as attached to the 303 church, and 180,000 to the 397 others.

By the Reform Bill, London returns Members of Parliament as under:—

City	4
Westminster	2
Mary-le bone	2
Finsbury	2
Tower Hamlets	2
Southwark	2
Lambeth	2
Greenwich	2

Besides 2 for the county of Middlesex and 2 for the northern division of Surrey. Making, in all, 22 members returned by the immediate influence of the metropolis.

The dense population of London may be illustrated by the fact that on each free bridge there passes from 50 to 80,000 foot-passengers per day, from 9 to 1,200 coaches, 5 or 600 gigs, &c. and 2,000 to 2,500 waggons, &c. besides 600 to 800 riding horses, and yet these are not the great town-thoroughfares, like Charing Cross, St. Paul's, and Cheapside.

Popular names are so often repeated in signs, that there are, in London, 13 Adam and Eves, 18 Angels, 38 Bells, 65 Coach and Horses, 78 Crowns, 56 Georges, 92 King's Arms, 86 Red Lions, and so with others. It is the same with streets; there are 20 Angel Courts, 12 Albion Places, 8 Bell Alleys, 18 Bell Courts, and 12 Bell Yards, 25 Caroline Places, 31 Church Streets, 54 Crown Courts, 61 George Streets, 73 John Streets, and so on.

In 1821, the population of London and its suburbs was returned at 1,225,694, in 164,681 houses, of whom 570,236 were males, and 655,545 females; 100 years before, it was half the number. They consume 110,000 bullocks, 776,000 sheep, 250,000 lambs, 250,000 calves, & 270,000 old and young pigs. Besides 900,000 quarters of wheat, and 1,000,000 chaldrons of coals, or 6 to a house; and all necessaries and luxuries equal to an expenditure of 3 or 400*l.* a year to every house.

Oxford-street, the longest in London, is 2,304 yards, and numbers 225 houses on each side. 21 cross streets of 20 yards occupy 450 yards, and leave 24 feet 10 inches on the average to each

house. Regent-street, the handsomest in London, is 1732 yards. Piccadilly is 1732.

The city, under the Lord Mayor, is the centre, extending from Temple-bar to Aldgate, and from the river to Moorgate, contains but 17,170 houses, and 125,434 inhabitants. It is divided in 26 wards, each with an alderman for life, and common-council elected annually. The executive officers being the Lord Mayor, and two sheriffs for the city and county.

The suburbs are under the control of twelve Police Offices, with a legion of policemen, under their own commissioners in Scotland-yard.

There are 26 ALDERMEN in London, elected for life by their several wards; from among whom, two are chosen by the livery, one of whom is selected by the aldermen for Lord Mayor. The sheriffs are elected by the livery, from among the citizens at large.

The LIVERY of LONDON are freemen, who are members of companies on taking an oath, paying fees, and being invested with a livery-gown of purple silk and fur. In these 12 or 15,000 persons are vested the corporate duties in common-halls, &c. simple freemen enjoying merely the right of trading in the city; and, if householders, the power of voting for the alderman of their ward, and for the annual common-council. The purchase of the freedom costs about 30*l.* and the livery from 35*l.* to 200*l.* or 300*l.*, according to company.

The income of the city of London, in 1828, was 128,300*l.*; and the expenditure 174,000*l.*

In London, there is the Royal Society, Antiquarian Society, and Academy of Arts, meeting at Somerset-house. Also the Royal Institution, in Albemarle-street; a Geological Society, Astronomical Society, Zoological Society, Linnæan Society, and Horticultural Society; all enjoying great reputation.

In London there are two new colleges, the KING'S COLLEGE, at Somerset-house, specially patronised by the high church; the LONDON COLLEGE, near Tavistock-square, chiefly patronised by the low church and Dissenters. They have professors and lecturers in all branches of study.

The SOCIETY of ARTS was established about 1750; and its object is to promote the polite arts, agriculture, manufactures, mechanics, and chemistry, in Great Britain and colonies.

The Apothecaries' Company was incorporated in 1617; and is provided with lecturer, &c. and a matchless laboratory, besides having a garden at Chelsea.

There are, in London, 28 hospitals, infirmaries, and asylums, mostly on a large and liberal scale.

There are 27 societies in London, devoted to various literary and scientific objects.

The Society for the Relief of the Widows and Orphans of Medical Men was founded in 1788; and another for army-surgeons in 1816.

There are 29 medical charities in London, under the name of dispensaries and institutions, besides the great hospitals.

There is a Choral Fund and a Royal Society of Musicians, patronized by the royal family.

There are 29 societies in London, for various charitable and useful objects.

There are, in London, 35 companies for insurance of lives and against fire.

There is a benevolent Society of St. Patrick, St. Andrew, and St. David, in London.

There are 40 institutions for special diseases in London; 20 for lying-in; 29 dispensaries; 15 for pecuniary relief; 10 pension societies; 58 miscellaneous; 11 in aid of police; 25 for improvements; 35 bible and religious; 18 missionary; 78 for education; and as many more parish and district schools; besides 12 for Sunday schools. In all, 351; besides private societies, equal in number.

There are CLUB-HOUSES in London, for classes of society on splendid scales, serving as common eating-houses for the subscribers at economical prices, as the Navy Club, the Army Club, the United Service Club, the University Club, the Athenian Club, and some gaming club-houses. The whole are a feature of London society, but they lead to trifling, waste of time, and a competition of personal extravagance.

The most interesting modern institutions in London are, the Zoological Gardens in the splendid Regent's Park, and their equal the Surrey, in Manor-Place, Walworth. They contain many hundred curious specimens of the animated world, from every clime, without any other annoyance to feeling than their prevention of liberty.

The British Museum library, its antiques, minerals, &c. &c. in extent and value, may be described as the most interesting wonder of the world.

Three of the London theatres hold 2500 persons each, three others 1800, and ten others about 800 each, in all nearly 20,000; but those open at one time are equal only to 10 or 12,000. Since the panic they have, in spite of very able management, been losing

concerns. Every thing, alas, bespeaks decadence, both in pleasure and business, and all the world understand the cause, except well-paid ministers and the highly-pensioned aristocracy.

The following are the Incomes of several Religious Societies in London.

British and Foreign Bible Society	£84,982
Christian Knowledge Society .	65,929
Gospel Propagation Society .	34,693
Church Missionary Society .	47,328
London Missionary Society .	48,226
Wesleyan Missionary Society .	46,302
Baptist Missionary Society .	17,185
London Jews Conversion Society	12,145
Hibernian (London) Society .	9,228
National School Society . .	2,183
Religious Tract Society . .	24,973
Slave Conversion Society .	4,375
Naval & Military Bible Society	3,396
	£400,950

There are Grand Lodges of Freemasons in London, Edinburgh, and Dublin, whose patrons are the king. In 1793, that of London addressed the throne in favour of the wanton and wicked war against France, giving zealous sanction to all the delusions and political falsehoods of the day.

Freemasonry arose in the middle ages. In 1717, the Grand Lodge of England was established; in 1730, that of Ireland; and, in 1736, that of Scotland.

In the London hospitals, not one in forty die; formerly, it was one in seven.

In 60 years, the Magdalen Hospital received 4594 females, of whom, 3012 were restored to their families.

Plagues and contagious diseases have been fatal to London.

In 1348	. .	100,000 died
1407	. .	30,000
1472	. .	40,000
1500	. .	20,000
1518	. .	23,000
1528	. .	25,000
1603	. .	30,578
1625	. .	35,417
1665	. .	68,596

Letters must be put into the General Post Office before 7, or at Branch Offices till a quarter before 7. And at the General Post Office till half-past 7, by paying sixpence, and till twenty minutes before 8, by paying postage, and sixpence. Newspapers must be put in the General Post Office before 6, and at the Branches before 5.

Postage is 4*d*. for 15 miles; 5*d*. for 20; 6*d*. for 30; 7*d*. for 50; 8*d*. for 80; 9*d*. for 120; 10*d*. for 170; 11*d*. for 230; and 12*d*. for 300 miles; and 1*d*. per 100 miles, above 300.

North American letters are 2*s*. 2*d*.; French 1*s*. 2*d*.; Germany and North, 1*s*. 8*d*.; Netherlands 1*s*. 4*d*.; Italy, &c. 1*s*. 11*d*.; Spain 2*s*. 2*d*.; South America 8*s*. 6*d*.; Jamaica, and West Indies, 2*s*. 2*d*.; to be paid on putting in.

Letters to the East Indies and New Holland pay postage to the ship from London, and 2*d*. sea-postage. Above three ounces, 1*s*. per ounce. Stamped papers, 1*d*. Newspapers to colonies 1½*d*.

In the General Twopenny Post, there are six deliveries in town, and three in the country districts, daily. An hour is saved at the General Post Office, and in Gerrard Street. The precision and dispatch is wonderful.

St. Paul's is 500 feet from east to west, 285 from north to south, and 404 feet to the top of the cross. The ball is 20 feet round, and weighs 4 tons, 12 cwt. with its supports 8 tons of copper.

Most of the new London churches are adapted to hold 1800 to 2000 persons.

Westminster-abbey is 360 feet long, and 195 feet broad.

The piazzas of the Royal Exchange are 144 feet by 117. In sad want of keeping, the centre is occupied by a statue of the dissolute Charles II., who shut the Exchequer, and ruined half the merchants in London.

Westminster Hall is 270 feet long, 74 broad, and 94 high. Guildhall is 153 long, 48 broad, and 55 high. The Opera-house pit is 75 feet by 46, and 55 high.

The Monument is 202 feet high.

The following are the dimensions of the London bridges:—

	Length.	Arches.	Width.
London . . . . feet	930	5	55
Southwark	708	3	40
Blackfriars	1100	9	41
Strand	1239	9	42
Westminster . . .	1223	13	44
Vauxhall	860	9	40

The centre stone arch of the new London-bridge is the largest known, being 152 feet span, with a rise of 29½ feet above high-water. The two on both sides are 140 and 136 feet.

The span of the centre arch of the Southwark Iron Bridge is 240 feet, and the others 213.

The docks of London, in imitation of those of Liverpool, but of greater magnitude, are from West to East. St. Katharine's near the Tower, 1823; the London docks adjoining, 1805; the West India docks, across the Isle of Dogs, 1802; the East India, at Limehouse, 1806; and on the Surrey side the extensive Commercial docks, and Surrey docks, 1827. Others also are planned, for colliers, south of the West India.

The London docks cover 20 acres, 14 tobacco-warehouses cover 14 acres, and the wine-cellar covers 3 acres, holding 22,000 pipes.

The two West India docks cover 54 acres.

St. Katherine's dock cover 24 acres, and accommodate 1400 vessels.

2000 ships are commonly in the river and docks, and 3000 barges. About 2300 barges ascend the river and canals for inland trade. And these and 3000 boats employ 8000 watermen, and in the docks, &c. 4000 labourers.

London manufactures silks, watches, jewellery, leather articles, millinery, pins, porter, books and newspapers, fine cutlery, machinery, spirits, optical instruments, and employs workmen in every known art, town-made goods and London patterns being in general request.

It is, in a word, the great mart and market for the best of every thing that is produced by nature or art. Yet law and lawyers, the withdrawal of the usual and the necessary currency, the total want of profits and remuneration, the destitution of productive employment, and the pressure of assessed taxes and rates, render the population miserable and discontented.

The annual supply of sacks of flour to Mark-lane is, from 4 to 500,000. In 1828-9, it was 523,106; in 1829-30, 368,888; and in 1830-31, 412,876.

The oats brought to market in the same years, were 1,530,425, 1,145,754, and 901,440 quarters.

The malt 246,905, 219,478, and 234,137 quarters.

But, of course, large supplies reach London, which do not pass through Mark-lane market.

London is estimated to consume nearly 40 millions lbs. of butter, at 1s. per lb. to the maker, or 2 millions worth. Cows produce about 168 lbs. per annum, so that London consumes the produce of 280,000 cows.

London consumes the produce of 6500 acres of garden ground, within 12 miles, and as many more within 30 miles, exceeding a million per annum. Also a million of quarters of wheat, of which about 64 millions of quartern-loaves are made. Butter 11,000 tons, and cheese 13,000 tons. Milk 10 millions of gallons. Butchers' meat 400 millions of lbs., value 10 millions, besides 350,000*l.* per annum in poultry, game, and fish. Potatoes are brought chiefly from the Humber.

London consumes 65,000 pipes of wine, 10,000 gallons of spirits, and 2 millions of barrels of porter and ale.

The gas lights of London consume 50,000 tons of coals. There are about 62,000 in-door lights, and 8000 out-door, on the average equal to 50 candles per light. Half-inch pipes are estimated equal to 20 candles; inch to 100, and 2-inch to 420 candles.

About 25 mining companies were formed in London, for South America, in 1825, and 6 or 7 still exist.

The free circulation of paper-money, and its facilities of credit and mortgage, have increased and improved London, within forty years, in so astonishing a manner. Houses, and even floors, were mortgaged as built, and the basement was begun by mortgaging or selling a ground-rent. This system began about 1781, and by its means the town has been doubled in size and splendour. The means were destroyed with general credit, by the ignorant Liverpool administration at the panic; and building, except as engaged, has since been arrested, and most of the builders ruined, owing to fall in rents, or foreclosing of mortgages.

London was not paved at the Conquest. The first toll for repairing a road, was from Temple Bar to Saint Giles's, the place of execution in the reign of Edward III. Holborn was paved in 1417. The first, or Westminster Paving Act, passed in 1762.

Paris was partially paved in 1184.

Illuminations became marks of rejoicing before streets were lighted. Paris was first lighted in 1524, by hanging out candles, and in 1555, by vases filled with combustibles.

London was first lighted in 1414, with private lanterns. In 1736, they were increased from 1000 to 5000. In 1744, the first lighting act passed. In 1820, gas was generally substituted for oil.

Rome and Lisbon are still unlighted, and generally without privies.

Coaches were introduced about 1510. In 1550, there were but three in Paris. They were first let to hire at the Hotel St. Fiacre, under the name of cabriolet, or cabs, with one horse; they were first used in Paris, and then in London, about 1824.

London is built on a bed of gravel; beneath which is a stratum of blue clay, 200 or 300 feet thick, below this sand, and then a stratum of chalk, which bassets in Bedfordshire and Oxfordshire, and conveys, on its hard surface, the water under the clay and sand. Hence, the gravel supplies some water; but, for a constant supply, it is necessary to penetrate through the blue clay, to the sand and chalk. It is then so abundant as to flow up like a fountain, and where bored only, to a height of 15 or 20 feet.—*Middleton.*

In the 97 parishes of London, the

annual amount of charitable bequests is but 7504*l*.

In 1666, the great fire burnt down 13,200 houses, and all the public buildings, including 86 parish-churches; and since then there has been no plague.

The roads out of London are now measured from ten different stations, some of them four or five miles from the others.

The revenue of Westminster Abbey, from taking 2*s*. from visitors, is about 1600*l*. per annum.

The Panorama of London, the wonderful work of HORNER, in the Coliseum, covers 40,000 square feet, or nearly an acre of houses, buildings, &c.

The British Museum is open every day, except Sundays.

Fifty days are kept as holydays at the public offices, in London, either fixed or moveable, besides Sundays.

About 3000 parcels arrive daily, in London, by coaches and waggons.

The tolls on Southwark-bridge, at 1*d*. for foot-passengers, were, in 1829, 6860*l*.

London is so vast, because it is not merely the capital of the United Kingdom, but of the colonies and colonists, in all parts of the world.

The term *cockney* is of Saxon age, and applied to all born within the sound of Bow-church bell.

It is estimated that London always supports, at least, 1000 itinerant musicians, either singly or in bands.

In the reign of Elizabeth, only forty Scotsmen were found in London; but the writers of the time say, that in seven years 40,000 followed in the train of King James, and the habit of trying their fortunes, "O'th south," continues in full force even to this day, so that half a million are now settled in England.

St. Paul's is 22 seconds of time west of Greenwich. Dublin Observatory, 22′ 22″ W. Armagh, 26′ 30″. Edinburgh, 12′ 41″ W. Glasgow, 17′ 7″. Paris Observatory, 9′ 21″ E. The most westerly point of Ireland is 41′ of time west.

The mean height of high-water at the London Docks varies from 22 feet 10 inches to 19.5.

At Sheerness, Captain Lloyd makes the mean level of the sea, . feet 8.53

The mean high-water mark .	15.76
Spring tide, high water . . .	17.615
High-water at Gravesend . .	18.7168
Mean high-water at London Docks	18.0029
Spring tide high-water . . .	19.6511
Mean level	10.5959
London-bridge brass standard, at landing-place.	19.2844

LITERATURE AND BOOKS.

Literature, as an employment of leisure, among the Moderns, is a substitute for the hunting and coarse employments of men just emerging from a state of nature. It is, in truth, at once the parent and the sign of civilization; and the character of nations and districts may be estimated by the number and prosperity of booksellers' shops.

The invention of conventional signs, characters, or letters, was the first step to that accumulated knowledge which we now find in the world. The first examples were records of regal vanity on stone; then a similar celebration in verse. The next, the regulation of reasoning in logic. The next, the observed motions of the heavenly bodies. The next, arithmetic and geometry. The next, geography, chronology, and history. The next, observations of nature, and the investigation of causes. But the free play of intellect proving injurious to monopolies of power, and the selfish advantages of superstition, which had obtained ascendancy before the invention of letters, these have always been opposed to the advance of knowledge, and have either limited, or neutralized inquiry. The age has therefore not yet arrived, when the pursuit of knowledge can be perfectly free; and advancement has hitherto been determined by limits authorised by power, or by prejudices inculcated by power, and operating directly or insidiously, so as to say to all pursuers of knowledge,—thus far thou mayest go, but no farther.

Books were originally boards, or the inner bark of trees, the word being derived from *Bench*, a Beech Tree. The Horn-Book, now used in nurseries, is a primitive book. Bark is still used by some nations; skins are also used, for which parchment was substituted. Papyrus, an Egyptian plant, was adopted in that country, and an article of commerce; thin plates of brass were also used for church service. The papyrus and parchment-books were commonly rolled on a round stick, with a ball at each end, and the composition began at the centre, the outer fold being its termination; these were called volumes. The outsides were inscribed just as we now letter books.

The MSS. in Herculaneum consist of papyrus, rolled and charred, and matted together by the fire, and are about nine inches long, and one, two, or three inches in diameter, each being a volume or separate treatise.

Poetry is the regulated effervescence of the brain. It is part of the excitement which takes place beyond the demands of natural wants, and thus

displays itself in flights called imagination, and in eccentricity often productive of personal inconvenience in the intercourse of life. Being natural, it belongs to every state of society, and is, therefore, the earliest display of all national literature. It advances in refinement, with langnage and arts, and as there are always over-excited brains, so there are always poets. Its subjects are feelings and sentiments, expressed with all the powers of language, illustrated by imagination derived from rapid sensations, displaying an exuberance of meaning, in contrast to the logical discipline of didactive, or argumentative prose. In a word, good poetry is the able display of feeling; and good prose the able display of fact, correct reasoning, and acquired knowledge.

Bards, among the Druids, were professional poets; and, among all ancient people, such employments were recognised, and connected with religion, prophecy, and music. Among the Jews this class were called Prophets, and their compositions called *Prophecyings*. The Greeks called them Ubates; the Romans, Vates; and the Britons, Bards. Ossian speaks of a prince who kept 100 bards. Chief-bards wore sky-blue garments; and, the most distinguished, a silver chain. Even Alexander the Great was accompanied by a bard named Cherylus, who was to have a piece of gold for every good verse, and a blow for every bad one.

Of course, when books were scarce, and the art of reading uncommon, they were very dear. The bequest of one to a religious house, entitled the donor to masses for his soul, and they were commonly chained to their station; while, in some ancient libraries, the books are chained to this day.

As examples of the prices of books, the *Roman de la Rose* was sold for above 30*l.*; and a Homily was exchanged for 200 sheep and five quarters of wheat; and they usually fetched double or treble their weight in gold.

When the passion for reading increased, the business of copying became considerable, and copyers enjoyed great reputation, according to their learning and accuracy. Hence they took it on themselves to purge and improve authors; and to this cause may be ascribed the precision and mechanical perfection of the classic authors, for the copyers plumed themselves on not transcribing imperfections. This advantage was, however, counteracted by the principles which governed them; and hence the first printers were also critics, like the copyers.

The fame of most writers is very ephemeral, chiefly owing to their choice of subjects of the day, or the age or nation. English literature does not preserve above eight or ten authors before the age of Shakspeare; not above 20 from Shakspeare to Addison, and scarcely 50 from the age of Addison to the year 1800. Since the days of Elizabeth, one or two books, or pamphlets, per day have been printed; but the subjects were obsolete theology, forgotten politics, or superseded philosophy, and the majority in bad method or bad taste. It has been the same in France, Germany, Italy, and Holland; and, doubtless, was the same among the ancients, though we so often lament the loss of ancient works.

Italy had, in the 15th century, so many associations, like our societies, called Academies, that there were 550 for general or particular pursuits. The French imitated the Italians in the 16th and 17th centuries; and, in the 17th and 18th, the English imitated both, in the Royal and other Societies; and of late they have been so extended, as, perhaps, to equal the Italian societies in number. They spread knowledge, but subdue original thinking by the deference to existing authorities. In Italy, therefore, no new discoveries are traceable to them; and, in England, the distinction in numerous ones consists in merely knowing the current knowledge repeated in books.

In general, literary and philosophical societies are close corporations, very unfavourable to originality and the advance of knowledge beyond a proscribed beaten track. They are usually governed by ancient authorities, and by the prejudices of the education of the senior or leading members; and, hence, having a certain weight with the vulgar, they impede the march of discovery. They help to spread what was known when they were founded; but they look with stern jealousy on all innovations, and guard, with vigilance, the orthodox faith recognized, continued, and cherished by their society. Thus they give countenance to error, and serve as engines to keep knowledge within the limits prescribed by civil and ecclesiastical power.

The slavish admiration and imitation of the ancients, and of all predecessors, is most unfavourable to future exertions, and injurious to succeeding ages.
Schlegel.

Besides the loss of ancient literature by the burning of the Alexandrian Library, by the christians in 391, and by the Saracens in 640, a nearly equal loss was suffered in the conflagration of the Basilican Library of 36,000 MSS, at Constantinople, in the 8th or 9th century.

120,000 Greek MSS. were burnt at

the sacking of Constantinople by the Turks, in 1452. None are now to be traced in the Greek convents.

Before the revival of letters, the monks used to sell the parchments on which Greek and Latin authors were written, to bookbinders and racket makers. Some eminent works were rescued by scholars in this way, and others were found rotting in lumber-rooms of monasteries and abbies. The Popes and Clergy waged war on historians and poets, as profane writers.

Again, to save the expence of parchment, the monks and calligraphists were in the practice of obliterating the previous writing, by a chemical preparation, or of erasing it from silk or flaxen paper, and in this way thousands of valuable MSS. have been lost. Greek dramas, works of Cicero, &c. &c. have been traced under the new writing, and Abbé Mai, of Milan, has in this way collected some valusble fragments of antiquity from Babbio. Under a trumpery poem, he traced three of the orations of Cicero, pro *Ssauro*, pro Tnilio, pro Flacco. Under some acts of a Romish Council, he traced three others, with an ancient commentary; also eight speeches of Symmachus, and the works of Fronto, tutor to Aurelius and L. Verus. Under another, he found fragments of Plautus, and commentaries on Terence; also an oration of Isæus. And, finally, he has restored a work of Dionysius Halicarnassus, and found 800 lines of a very ancient Iliad.

We are indebted to the Arabians and Saracens for romances and tales, for the numerical character, for astrology and astronomy, for medicine, for chemistry, for commerce, and for a language the most copious in the world, which spreads over Asia and Africa, and for the religions that divide the Western world, though in all ages, except the Saracenic, they have lived in small communities, and have scarcely presented to foreigners the aspect of civilization.

The first recorded novels are the Milesian Tales of Aristides, which were translated from Greek into Latin by Sisenna, about 60 B. C. They are lost. Nicenus was the next, and forty of his sketches exist. He wrote in the age of Gallus and Virgil.

In sixty years after the invention of printing, about 1440, the Popes took alarm, and printed lists of forbidden works, and required others to be licensed, by three friars, under pain of excommunication, fine, &c. Till then writing and printing were free. Cologne, Mentz, Treves, and Magdeburg, were specially interdicted.

Causes which *limit* the social benefits of printing merit notice. One is the power of anonymous and irresponsible publication, by which sophistry and bad passions enjoy undue power; another is, the expence, by which poor students and original thinkers are shut out from the world, and a third is the commerce in books, in which gain is the sole object, with an utter disregard of truth or falsehood. MSS. required the sanction of the author's name, but half the sheets printed and puffed into ephemeral notice, are written for base secret purposes, sometimes sordid as in trading criticisms, at other times venal as in newspapers, and often to promote the interests of some craft. The expence, subjects truth, and knowledge to the chances of the lottery of wealth. And the commercial objects raise and perpetuate only fashionable and agreeable opinions, so that folly appears in splendid forms, while wisdom and originality are either suppressed, or make a very humble and uninviting appearance.

Cornelius Agrippa, an original man of the 15th century, wrote a volume on the Vanity of the Arts and Sciences. He exposed the Pedantry and Team-horse system of the schools in his day, and a similar exposure might be written in this, and perhaps every age. Though the profession of Universities is knowledge, yet the personal object is gain, indulgence, and promotion, not above two or three appearing in a generation, who devote themselves to knowledge, and not above one who possesses or affects the least originality. So it is in literary and scientific associations; there are many members, but very few philosophers, and among the 1000 or 1100 men who, by fashion, name, or vanity, are fellows of the London Royal Society, for example, there seldom are above a dozen to whom science is a pursuit, and not more than one or two of these that possess or even affect originality. Both Universities and Societies have, in fact, more shew than substance, and yet they are so imposing on the world, that they set the fashion in knowledge, and wretched and degraded in his day is the independent true philosopher, who, scorning it, like Roger Bacon, does not follow it.

Writing and printing books is essentially a mere literary speculation, and when sought to be rendered commercial, has seldom succeeded. Books are a lottery, with three or four blanks to a small prize, and 500 blanks to a capital prize. Hence a publisher labours like a Sysiphus. The 18th century enabled few publishers to realize. The Tonson family became

opulent through a patent for 100 years, to supply the public offices with stationery! Miller left 20,000*l.*, Lintot, 6000*l.*, Cadell, 30,000*l.*, chiefly derived from other sources. Dodsley, 7000*l.* in 50 years, Dilly, 30,000*l.* in 50 years, Johnson, 25,000*l.*, in 45 years. But Hodges, Cooke, Harrison, Crowther, Evans, Robinson, &c. &c. died insolvent, and perhaps 500 others.

The whole book trade in Germany centres at Leipsic, and all writing and publication have reference to its Easter Fair, for there and then the whole trade is supplied by an agent. John Otto, of Narnberg, was the first speculator in copyrights, and soon after he had two imitators at Leipsic. The first Easter catalogue was published in 1600, and regularly since. It is now a large closely-printed volume of new books, and new editions. Copyright does not extend to all the States, and therefore original German books are so shabbily and cheaply printed to prevent piracies, while copy money is also low, since all superior works are pirated.—*Russell.*

Professor Babbage has published an affecting volume, on the Decline of Science in England, and the fact is undoubted. All study has reference to commercial profit, or mere show; while increasing societies are sustained by subscribers and amateurs, not by philosophers, the ratio varying from 50 and 30 to 1. Students in mathematics, the basis of all exact knowledge, have diminished within a century from thousands to tens. In regard to societies, the system of ballot excludes original thinkers and improvers of knowledge, and reduces the new members to obscure conformists and genteel adulators. The close corporation system is alike fatal to scientific and municipal wisdom, for election in-and-in necessarily causes deterioration of intellect, in every succession.

To protect authors, the act of Anne permitted them to assign leases of *only* 14 years, when their property for their future provision reverted to them. But, by a gross blunder of legislation, they were in 1814 empowered to grant leases for 28 years, by which the entire object of copyright law, as to authors, has been totally defeated. The first was a law passed under the influence of an administration of men of genius, the last under the Goths and Vandals, who misruled from 1765 to 1830, and yielded to the suggestions of a knot of lessees or publishers.

The decline of literature, in England, has been accelerated, or caused by a passion for novel reading, which deprives all other studies of their reward. It resembles the Roman literature in the decline of the empire; and, for some years past, few books but novels have paid their expences. A good novel yields its author 1000*l.* or 1500*l.*; and Dr. Johnson's high price for his Dictionary was but 1575*l.* A novel, written in two months, will yield its author 400*l.* or 500*l.* as a current speculation; and England has, therefore, become a nation of superficial novel writers and readers.

Since the Hanoverian succession, literature, and literary men, have been cruelly neglected; and, since the establishment of the very useless eleemosynary Literary Fund, the nobility have entirely withdrawn their once-efficient support from men of letters. The penny and twopenny publications of scraps and extracts have left original authors without hope.

The literary education of women, began to prevail in the early part of the 17th century. Till then, few were taught more than to read, but writing was then superadded, music, dancing, and French. In 1630, neither of Shakspeare's daughters could write. The change wrought changes in literature. To provide books for female readers, novels were contrived; and, owing to women having leisure, they were multiplied; and, since 1780, have so grown in number, and commercial importance, as almost to supersede all other books, and render them but secondary in profit, to authors or publishers.

Reviews of books, under the false pretence and colour of criticism, are usually written by the friends or enemies of authors, or of the publishers of the works, and are trading frauds, which now delude only the ignorant. No such opinions ought to have any authority, without the known name of a responsible critic. Nevertheless, a malignant spirit in readers, who often delight in slander, occasions the most vituperative anonymous criticisms to be most read and patronised.

England is the only country in which books are advertised, and this expense adds 30 per cent. to their price. In France, two copies are sent to about 20 journals, and their notice is the sole advertisement, besides the public voice. In England the public voice is surrendered to advertisements and puffs in every form, aided by mock criticisms.

Colonists are grossly abused by the exporters of books, and the ignorance of merchants; and they get few books but such as are mere waste paper in England. The merchant usually orders a case of books, of 100*l.* or 500*l.* value, forgetting that there are books of every variety of intrinsic value; and then

the dealer avails himself of this inadvertency, and fills the case or cases with none but such books as few ever saw in England, and which can generally be bought at the price of waste paper. Fine binding is the chief feature of books thus sent abroad.

Professor Cooper, in speaking of the very low state of knowledge in America, observes, that silly poetry, novels, romances, and newspapers, with theological tracts, manufactured to impose on credulity, are plentifully distributed; while law and medical books, as tools of trade, are often reprinted; but there is no knowledge for its own sake, and education and study have every where a pecuniary reference. Even in seminaries of education, appointments too often depend on the struggles of the ambitious bigots of contending sects, and all colleges, except one or two, are sectarian. Congress, by heavily taxing foreign books, have exposed the people to reprints of Byron's poems, and Scott's novels; but in this law, the ignorance of the community has been faithfully represented.

All the first and second-rate towns of the United Kingdom have fixed libraries, sustained by 50, 100, or 200 subscribers, at one or two pounds per annum, with a premium on admission. London has seven or eight, with from 300 to 600 subscribers. They buy the new books and journals, and usually have newspapers. When not governed by theological or political partizans, they are eminently useful and agreeable. The first were formed in the great towns, about 60 years ago, and there are now at least 500, many with excellent libraries.

Another species of convenient literary establishment, a century old, is the circulating Book Society, formed by 20, 30, or 40 subscribers, who, after a fixed number of days, forward the books from one to another, in a rota, fixed by their facility of communication. A secretary, usually a bookseller, puts them in circulation, and receives them again, and once a year they are sold at a dinner of the members, and the produce expended in new books. The subscriptions vary from 15*s.* to 30*s.*, and of such useful associations there are at least 1000.

There are also some minor associations, for theological and professional books. Novels, tales, &c. are chiefly read through about 1500 circulating libraries, by the volume or year.

In the southern counties of Scotland, there are itinerating libraries, invented by Samuel Brown. When a library has been read by a village, it is exchanged with that of another village, and their variety of books given to both. There is a head station to a given number of libraries thus circulated, and to which each returns every two years for reparation, &c. Each library is about 50 volumes, and with its case, costs about 12*l.*

The Alphabets of different nations contain the following letters:—

English	26	Greek	24
French	23	Hebrew, &c.	22
Italian	20	Arabic	28
Spanish	27	Persian	32
German	26	Turkish	33
Sclavonic	27	Sanscrit	50
Russian	41	Chinese	214
Latin	22		

Thoth, the Egyptian, who invented writing, perhaps hieroglyphics, lived between the years 2,000 or 2,500 B. C. But, Josephus says, he had seen inscriptions by Seth, the son of Adam. If so, then Thoth, or Hermes, were not the inventors of writing, or Josephus must on this, as on many subjects, be fabulous.

The first letter of the Phœnician and Hebrew alphabet was *Aleph*, which the Greeks called *Alpha;* and the moderns, by abbreviation, A. They also used them to count; and, it is curious that *tau*, used by them for 100, is, in the games of English school-boys, the name of a white marble, worth many common ones. The word Alphabet is the names Alpha, Beta, just as we say the A, B, C. The Hebrew language and letters are believed to be derived from the Phœnician, since Tyre, Sidon, &c. were distinguished cities in the age of Moses and Joshua; and even Abraham lived in their territory.

Sanscrit, the basis of Hindoo learning, is said in the east to be the first character. It is taught at Benares by pundits, or doctors; and the pupils read the Puranas, or abridgments of the law, and study philosophy, very like that of the Greek schools.

Chaldee, Phœnician, or Syriac, ascribed to Adam, Enoch, Noah, Abraham, and Moses, is the same as the Hebrew.

Thaut, or Thoth, a Phœnician, son of Misraim called Hermes and Mercury, is believed only to have modified the older Sanscrit Alphabet, which was brought from the east by the commercial Phœnicians. The Sanscrit contains 16 vowels and 34 consonants, and is probably the parent of most of the Oriental alphabets, even of the Greek.

Cadmus, the Phœnician, introduced the first Greek alphabet into Bœotia, where he settled, B. C. 1500; though Diodorus says the Pelasgian letters

were prior to the Cadmean. But it is evident that the Cadmean and Pelasgic, and Phœnician, had the same origin.

The Samaritan, or Phœnician, was the original Hebrew character; and the present alphabet was invented after the captivity.

The Irish alphabet is the Phœnician.

The Greeks called the Phœnicians *Pelasgii quasi Pelagi*, because they traversed the ocean, and carried on commerce with other nations.

Scaliger supposes the Phœnician to have been the original Hebrew character, otherwise the Samaritan, which is generally supposed to be that which was used by the Jews from the time of Moses to the Captivity.

The alphabet of the Sanskrita is called the Devanagari.

The Oriental Alphabets are Hebrew, ancient, modern, and rabbinical. Samaritan, ancient and modern. Phœnician. Syriac, ancient and modern. Egyptian hieroglyphic. Chinese characters.

The Greek Alphabets were Cadmean, Pelasgian, Sigean, Nemean, Delian, Athenian, and Teian. Also Ionic, or alphabet of Simonides.

The Alphabets derived from, or allied to, the Oriental Alphabets are, Cufic, Arabic, Persian, Saracen, Ethiopic, Mendean, Malabaric, Mantchou Tartar, Sanscrit, Japonese, Thibetan, Rejang.

The Alphabets derived from the Oriental or Greek Alphabets are, Ancient Irish, Bobeloth and Bethluisnon. Ogums, namely, Croabh and O'Sullivan's. Coptic, Armenian, Georgian, Dalmatian, and Russian.

The Northern Alphabets are, Gothic, ancient, modern, and Mæso-Gothic. Runic. Welsh. Saxon, ancient and modern. Teutonic. German, printing and current. Flemish. French, ancient and current. Norman and Anglo-Norman. Bastard, ancient and round. Lombard. Charlemagne. Black Letter. Chancery, round and running. Court Text. Church Text.

There are strong resemblances between the Egyptian art of writing and the Chinese, but the latter is more artful than the former. Both in effect have an ideal and syllabic power, and also a phonetic or alphabetic power, and this last seems to be the application of a principle which they developed to other nations, who sought only to assimilate sounds, and hence arrived at the alphabet without its hieroglyphic or ideotic, and its syllabic machinery.

Both the Chinese and the Egyptians could express sounds, but the characters were not disserved from their system.

Mr. Morrison gives preference to the Chinese characters, as more impressive than alphabetic characters, and refutes the objections raised against their picture of ideas by the scholars of the west. The keys of the language are 214, the characters by which others are formed are 3867, or in fact 1903; and from these, by adding an element, the body of the language is formed. 846 mono-syllables form the vernacular tongue.—*Marshman.*

Greek is formed from 3,500 primitives, Sanscrit from 1,700 dhattors or roots, Welsh, from about 300 roots.

The modern characters of the Chinese are 30,000; but the works of Confucius contain but 3,000. Their great dictionary contains 43,496.—*Marshman.*

Their verbal language is far more simple, and in principle like the Welsh, and consists of 330 mono-syllables, which, by accent, are extended to 1,300 sounds: and the composition of these makes up the colloquial language with a sort of philosophical precision. Its attainment by foreigners is, therefore, not difficult; and though their standard dictionary contains 36,000 words, yet our Todd and Johnson contain 80,000; the Scapula 44,000 Greek words; and Ainsworth 45,000 Latin words, independent of inflexions.

The standard dictionary of the Chinese language, according to Mr. Morrison, contains about 40,000 characters, in 214 classes; 150 of which include the more important words, and 60 of them about 25,000. The whole was arranged and perfected by Pa-out-she, who lived about 1,100 years B. C. Most of the characters are hierogliphic, or rude representations, like our signs of the zodiac. At present, they are divided into 17 classes, beginning with that formed by one stroke, and ending with those formed by seventeen.

The Welsh language, always regular and significant in its monosyllables, uses the word *pen*, to signify the top; *mawr*, great; *tre*, for a house; *aber*, for the confluence of rivers; *Avon*, for a river; *care*, for a fortification; *Llan*, an inclosure; *ys*, pronounced *us*, for lower; and *uwch*, for upper; *coed*, for a wood; *cwm*, pronounced *coom*, signifies a deep valley; and *yr*, pronounced *ur*, is the article—the; and its constant repetition leads to the vulgar jokes about the *yr* or *ur*. Their nouns have no cases. The Bardic alphabet consisted of the primitive or radical characters, and 24 secondary ones, formed by cutting letters on a stick in a triangular or square form.

The Coptic is an alphabet called from Coptos, in Egypt, a mixture of Greek and Egyptian. The characters of the

ancient Egyptians were of three kinds, vulgar, sacred, and hieroglyphic.

Ethiopic, or Abyssinian, is derived from the Samaritan or Phœnician.

The Etruscan was the first alphabet used in Italy, so called from the Etrusci, the most ancient inhabitants.

Gothic, the most ancient characters under this name, are attributed to Bishop Ulphilas.

The most ancient Arabic, called the Kufic, is so named from Kufa, on the Euphrates, but is not now in use. The modern Arabic was invented by the Vizier Molach, A. D. 933, in which he wrote the Koran three times.

Armenian is used in Armenia, Asia Minor, Syria, Tartary, &c. It approaches the Chaldee or Syriac, and the Greek.

The Malay language, common to the Oriental islands and coasts, and in dialects to the Isles of the Pacific, is softer than the Italian, and totally unlike any other language. It has no written character, but the Arabic has been adopted.

The spread of the Arts of Life, of Religion, &c. have assimilated languages in certain respects, and hence the endless hypotheses of Philologians, who happen to find in all languages some words nearly alike. Perhaps the oldest languages are the Sanscrit, Arabic, Malay, Chinese, Welsh, and Sclavonic, but every tribe seems to have a language of its own, or an application of sounds to things depending on varied articulation. So it appears in the small American Tribes. The inventors of gunpowder and the steam-engine would transfuse new words into every other language from the language of the inventor. So with writing, metallurgy, printing, horticulture, &c.

There are two languages spoken in Germany, one called Low Dutch and the other High German. The former prevails in Westphalia, Prussia, Lower Saxony, and on the coast; the other is spoken on the Rhine and Danube.

A Cherokee, named *Sus-gue-jah*, about 1820, invented an alphabet of the Cherokee language; and also digits for numbers, to effect the purposes of "the speaking leaf," but without any knowledge of other characters or digits.

Champollion and Lehonne maintain that the Zodiacs found in Egypt were put up during the Roman dominion in Egypt, and that the temples of Esné and Denderah were of the same age. But others ridicule their system of interpretation, as well as that of Dr. Young.

Musicians consider that Italian was always the vernacular tongue of Etruria and Italy, and Latin the language of the literati; and they draw the inference from the imposibility of accommodating Latin to music.

Latin smothered the ancient Greek in the middle ages, and produced the Romaic dialect or modern Greek.

Demetrius Chalcondyles, Emmanuel Moschopulus, Johannes Argyropulas, Theodorus Gaza, and Constantius Lascaris, were the learned Greeks who fled from Constantinople to Italy and France, in 1452, where Aurispa, Filelfo, and Chrysoloras had already created a taste for Greek literature.

The likeness of Greek to Romaic is similar to that of Latin to Italian.

Professor Mezzofanti, of Bologna, living in 1825, spoke 32 living and dead languages. In 1832 he became insane, and mingled all his languages in confusion. Among others he spoke the Zigan, or Gypsy Tongue, which he described as a dialect of the Pariahs in Hindoostan.

In 83 American languages, only 170 roots of words are common to both Continents, and three in five of these have Tartar affinity. Common organs of voice might have been expected to have increased the number.

The languages of South America have become different, by giving for name to the son a new word for the name of the object after which his father was called. The object and all its derivations were thus changed in each tribe, and in a few generations the language.—*Dobrizhoffer.*

Smart calculated 20,410 noun substantives in Johnson's Dictionary, 9,053 adjectives, 7,880 verbs, and 2,592 adverbs. Todd and Taylor have increased these full half, making about 60,000 words in the English language.

Horne Tooke, in his fanciful theory, endeavours to make it appear, that *if* is derived from the Saxon *giffan*, to give; but from *botan*, to boot; yet from *getan*, to get; though from *thaffigan*, to allow; unless from *oulessan*, to dismiss.

T. Sheridan reckoned 28 simple sounds, and proposed a new alphabet of 9 vowels and 19 consonants.

An alphabet of 13 letters has been proposed,—the five vowels and the consonants b, g, d, l, m, n, r, s.

Gardiner thinks that the letters of the alphabet were rude pictures of the mouth in sounding them.

A dozen English words end with *a*, and two dozen with *o*; nearly 5,000 with *y*; *ough* has 8 sounds, as *up*, *on*, *o*, *off*, *uff*, *oo*, o, and *aut*.

During six or seven centuries the Latin tongue prevailed in all public proceedings, from the Tweed to the Euphrates, and from the Danube to

Mount Atlas; and the language of the rapacious Roman conquerors has been more or less retained by servile classes even to this day.

Adelung, the celebrated German philologer, was born in 1734, and died at Dresden, in 1806. His German Dictionary is the standard of the language. In his general history of languages, he gave specimens of the Lord's Prayer in 500 languages and dialects.

The first Greek writers were Homer and Hesiod, 1,000 B. C.; and Tyrtæus and Archilochus, in 700; and Alcæus, Sappho, and Anacreon, in 600.

The first Latin writers were Plautus, Ennius, and Terentius, in 200 B. C.

The first British, Gildas, Nennius, and Bede, in 600 and 700.

The first German, Eginhard, Wallafrid, and Rabanus, in 800.

The first French, Fort, Gregory, and Maralfe, in 500.

The first Spanish, Anlan, Fulgentius, and Martin, in 500.

The first Polish, Yaraslof and Nestor, in 1,000.

The first Italian, Gratian, Falcand, and Campanus, in 1,100.

The Poems of Homer were chiefly traditional and oral, till Pisistratus collected them in writing 4 or 500 years after the age of the poet, just as Ossian was collected by Macpherson. In the east, it is believed that there are not a dozen copies of the Shastah, Vedah, and Zenda Vesta. In 1400, there was scarcely a book in Rome but missals.

The works of Homer are supposed to have done great injury to mankind, by inspiring the love of military glory. Alexander was said to sleep with them always on his pillow.—*Darwin.*

Doubts are entertained whether the Odyssey was not the work of a later writer than Homer.

Orion was not meant by Job or Amos. The translators so rendered the word Kesil, but without warrantry. The Kimah of Job means the Pleiades.

The Egyptians, Persians, &c. had no drama. The Etrurians were the European founders of what their language calls the Histrionic art. The Hindoos and Chinese preceded them. Sacontala, or the Fatal Ring, from the Sanscrit, is the earliest drama known. The mysteries represented by the Romish Priesthood were of the 15th century. The Athenians bequeathed the art in the works of Æschylus, Sophocles, Euripides, &c. but their performances were in buildings without roofs, and by day-light. The Romans introduced roofs, &c.

Schlegel considers Solon as giving the first start to Grecian literature.

Thales founded the Ionic school, and his successors were the ever-memorable Anaximander, Anaximenes, and Anaxagoras.

The early Chinese literature suffered a similar misfortune to that of the west in the destruction of the Alexandrian Library; for their Emperor, Cheewhang-tee, ordered all writings to be destroyed, that every thing might begin anew as from his reign; and their books and records were afterwards recovered by succeeding emperors with great difficulty. So the Musselmen, conquerors of Hindoostan, destroyed the chief part of the most ancient writings.

In Thibet, there is a Cyclopedia, in 44 volumes; and lithography has been practised there from time immemorial.

The preserved plays of Æschylus are 7, of Sophocles 7, and of Euripides we have 7 tragedies. The chorus in which the audience joined kept the interest alive, and echoed the feelings excited. The plays of Æschylus were mythological and heroic. Sophocles descended to real life, and wrote from 80 to 130 pieces. Euripides illustrated the passions, and studied stage effect. Aristophanes was their Foote.

A perfect Livy was in the Grand Seignor's Library, in 1615. High prices were offered for it by ambassadors, but the book soon after disappeared.

Dr. Clarke found a MSS. copy of Plato in the neglected library at Patmos.

Antar, an Arabian hero of the 6th century, celebrated his heroism and romantic love for Ibla, in a poem as much esteemed in Arabia and Egypt as any poem ever was in Europe.

Anciently, odes were divided into Strophe, Antistrophe, and Epode. The Epopœia is the subject.

The Figures of Rhetoric are similes, metaphors, allegories, and personifications. Some forms of expression are also called figures, as irony, antithesis, climax, apostrophe, hyperbole, &c.

Heroic measure, in English poetry, is ten syllables. Iambic verse, is when unaccented syllables alternate with accented. In Anapestic verse, the accent falls on every third syllable.

A dactyl is one long and two short syllables; a trochee is one long and one short; a spondee is two long syllables; and iambics are like trochees. There are 28 feet, or metres, consisting of two, or three, or four short and long syllables. Hexameter verse is of six feet, the first four, dactyls or spondees, the fifth a dactyl, and the sixth must be a spondee. Pentameter is five feet. The two first dactyls, or spondees; the third a spondee; and the two last anapesta, or two short and one long syllable.

A syllogism is a process of reasoning from a general or *major* proposition by a *minor* one, and affirming or negativing the assertion in the *major* as to the *minor*, in a *conclusion* or inference. Equivoques in the use of words, in the major or minor, lead to sophistical conclusions, and to the endless confusion of opinions.

Syllogisms have four figures—1. When the middle term is the subject of the major proposition, and the predicate of the minor. 2. When the middle term is the predicate of major and minor. 3. When the middle term is the subject of both. 4. When the middle term is the predicate of the major, and subject of the minor. Each figure, also, has its moods. Syllogisms are also conditional, disjunctive, &c. &c.

Every proposition consists of a subject and predicate, and of a connecting word called the copula, either affirmative or negative.

The predicate is that which is affirmed or denied in any proposition.

The classes of Sophisms or false reasoning are—

1. *Ignorantio Elenchi*, or a mistake of the question.

2. The *Petitio Principii*, taking for granted what is to be proved, or *arguing in a circle*.

3. The *non causa pro causa*, making that a cause which does not exist at all, or in the case in question.

4. The *fallacia accidentis*, drawing general conclusions from accidental circumstances.

5. A *dicto secundum quid, ad dictum simplicitur*, a general deduction from particular circumstances; or a general truth applied to all circumstances.

Another sophism arises from the ambiguity, or double sense of words.

A *genus* is a general resemblance, as, that of the horse, ass, mule, zebra, is one genus; so oxen, buffaloes, bisons, &c. are another genus; and, of these, the horse, the mule, ox, &c. are species.

Every oration, or argumentative discourse, consists really or covertly of an *exordium, question, narration, argument, refutation, conclusion*, and *peroration*.

Before the art of printing, books were of incredible price. From the 6th to the 13th century, many bishops could not read, and kings were scarcely able to sign their names; and hence the use of seals and sealing. These were the ages in which superstition, witchcraft, and priestcraft obtained so universal an ascendancy. From 500 to 1200, all learning was in the hands of the Arabs, Saracens, and Chinese.

Copying was, in Greece and Rome, a productive employment; but it afterwards fell into the hands of the monks, who copied chiefly theology.

A good copy of the Bible, on vellum, employed two years; and the works of either of the Fathers still more time. Jerome states, that he had ruined himself in buying a copy of the Works of Origen. Of course, copiers altered and vitiated, corrected the language, interpolated, &c. according to their honesty, taste, faith, or party; and hence the endless controversies among critics and theologians about words, phrases, and paragraphs. It thus appeared, that, at the Council of Nice, in 325, there were 200 varied versions of the adopted Evangelists, and 54 several Gospels preserved in various Christian communities, but so scarce, that no Roman historian or writer appeared ever to have seen any of them.

Some writers give the invention of printing to Guttenberg, of Mayence; while others ascribe it to Faust, (often called Dr. Faustus), of the same city; and others, to Lawrence Koster, of Haerlem. The copyists made so great a clamour, that the parliament of Paris at first, to oblige them, caused all printed books to be seized.

The first printed books were trifling Hymns and Psalters, with images of saints, and, being printed only on one side, the leaves were pasted back to back. One of the first was the Biblia Panperum, of 40 leaves, which, pasted together, made 20. An entire Psalter was printed, in 1457, by Faust and Schoiffer: and a Bible, in 637 leaves, in moveable types, was printed at Mentz, between 1450 and 1455: but the most important part of the invention (that of the moveable types) is uncertain, both as to name and date. The first characters were Gothic; and Roman type was first used in 1467.

Printing by blocks was an extension of the art of seal engraving, which had been carried to great perfection in broad seals. The first printed sheets were worked only on one side the paper, and the impressions produced by a plane and mallet. The ordinary printing-press was first made by Bleau, at Amsterdam; in England, the first types were cast by Caslon, in 1720. The printing-machine was first suggested by Nicholson, in 1790, and perfected by Koenig. Stereotype printing was used in Holland, during the last century. The rollers for inking the types was the suggestion also of Nicholson. Stereotype printing was introduced into London, by Wilson, in 1804. The last-adopted improvements have been the Stanhope press, and the Columbian press.

Caxton was the first English printer, and his printing-office was in the Chapter-house of Westminster Abbey. He learnt the art in Germany, and was liberally patronised in England. The first book printed by Caxton, was in 1471, and bore for its title "*Willyam Caxton's Recuyel of the Historyes of Troy, by Raoul le Feure.*" While the Bibliomania prevailed, a copy was knocked down, by auction, for 1060*l.* 18*s.*

A sheet of type is about 120 lbs., or 60 lbs. to a form. The proportions in founts, as 100,000 letters in English, would be 5000 a; 3000 c; 11,000 e; 6000 i; 2000 m; and of k, q, x, and z, not above 30. Antimony, alloyed with lead, makes types.

The printing-press, valuable as it is, has been unfavourable to the perfection of modern books. An author prints a large edition, and often has no opportunity of correcting; but every copy was an edition to an ancient author, and he had as many opportunities of revising as there were copies made. This explains the precision of the classic authors, which would be increased by the taste of learned copiers in after-ages.

The utility of printing, as far as regards the progress of truth, is counteracted by the great expence of setting the types; for, as all books sell best which flatter prevailing opinions and support vested interests, and as they are printed chiefly at the risk of traders, who look to sale and profit, so few (very few) printed books contain the whole truth, and nothing but the truth.

Stereotype forms of a Bible, in 4to., exists at Leyden, from which impressions have been taken since 1711. At Haarlem, also, is another stereotype form of a Dutch Bible, which dates in 1705. John Muller, minister of a German church at Leyden, contrived, about 1701, this new method of printing, similar to stereotyping, as now practised.

The Journal des Sçavans, was the original of works of periodical criticism. It was imitated in all countries—at length, the Monthly Review took the lead in England, and had its rivals; but the activity of literature early in this century demanded Weekly Reviews, and we have the Athenæum, the Literary Guardian, &c. at 4*d.* and 3*d.*

The first, in England, was called the Waies of Literature, which commenced in 1714, and was discontinued in 1722; and the present state of the Republic of Letters began in 1719.

Various Periodical Miscellanies were commenced in the reign of Queen Anne, and continued for various periods. Cave took up an old title in the Gentleman's Magazine, in 1731; and, in 1732, the London Magazine was begun.

The total number of new publications, in the year 1822, in London, was 693; and their cost, in boards, 230*l.* They have since increased to 800, at a cost of 400*l.* for one copy of each.

In 1782, England had but 79 newspapers. It now has 250, and the United Kingdom about 340.

The newspapers in the United Kingdom have an average sale of 120,000 per day, consuming 81,600 reams per ann.; and the 150 periodicals about 30,000 reams. The stamp-duty on these papers, in 1829, was 509,546*l.*; and the duty on the paper only, was above 30,000*l.* In France, in 1828, the sale was 144,000,000, or 288,000 reams. The reams of paper, stamped for the periodical press, in 1820, was 50,717 reams. North America, in the year 1720, possessed no more than seven newspapers; but, in 1830, the United States had 550; 220 twice a week, and 50 daily.

The London morning papers employ from 60 to 80 persons. Their machines perfect 2000 papers per hour, *i. e.* eight tokens, or ordinary hours' work, at the usual printing-press. Eight or ten reporters relieve each other every hour, during parliamentary debates, and from 24 to 30 compositors set slip by slip, as copy arrives, and the papers are on sale often within two hours after speeches have been delivered. A large paper contains about 360,000 distinct letters and spaces. An expert compositor picks up 1200 in an hour.

Newspapers are obliged to give bond and security for 400*l.*, as protection against private slander.

There were, in 1830, printed in London, daily or weekly, 54 distinct newspapers; and, in England and Wales, 154 others. The whole number of papers which they sell in a year, is 40 millions. The 208 in England, and 36 in Scotland, make 346 publications per week; and, in a year, 17,200 several separate publications, which gives an average of 1400; but about one-tenth publish treble this number; one-tenth double this number; two-tenths, a fifth this number; another two-tenths, about 1000; so the other four-tenths sell from 750 to 500, or average 625.

In 1829, the clerks of the roads transmitted, from London, 1,207,794 newspapers; and 316 daily papers abroad; while the various venders transmitted 10,654,912.

The 40 millions of newspapers, sold annually in England, consume 81,000 reams of paper; and these 346 several publications give constant employment

to ten persons on each, as editors, printers, publishers, &c. &c. In London, about two-thirds of the matter in each is printed from MS.; in the country, about two-thirds is transferred from the London and other papers.

One of the largest Sunday papers contains seven columns per page, and is 24½ inches long by 19½ wide, containing 480 square inches per page. The four pages contain, therefore, 1,920 square inches, and every square inch, on the average, 32 words! Hence, this surprising sheet contains above 60,000 words, sold for *7d.*, or 2150 words for every farthing.

The word *Gazette* is derived from the name of the Venetian coin, which was the price of the first newspaper.

The London Gazette was commenced at Oxford, on November 7, 1665; the Court then residing there, on account of the plague.

Stamps used for London Papers in 1829.

Times, and Mail	3,275,311
Herald, & English Chronicle	2,000,475
Chronicle, and four others	2,333,450
Morning Post	593,500
Courier	995,200
Globe	864,000
Sun	625,000
John Bull	337,500
Bell's Messenger	566,000
Ditto Dispatch	780,552
Literary Gazette	70,430
Cobbett	176,500
Atlas	246,200
Age	250,000
Sunday Times, &c.	407,003
News	253,000

The Age and Numbers of the Newspapers of London, on February 1, 1831:

Morning Herald	65 years	20,702
Morning Chronicle	61 ditto	19,167
Times	46 ditto	14,501
Morning Advertiser	39½ do.	12,409
Courier	39 ditto	12,326
Sun	38 ditto	11,978
Globe	28 ditto	8,821
British Traveller	19 ditto	5,974

The St. James's Chronicle is the oldest.

The Dublin papers consumed, in 1830, 2,262,513 stamps. The highest, daily, were the Evening Mail, 439,000; Saunders' News Letter, 434,500; the Evening Post, (three per week), 293,350; the Evening Packet, 198,172; the Morning Register, daily, 196,300; the Weekly Register, 154,860.

The English Periodicals have a circulation nearly as under, in 1832:

Evangelical	9000
Armenian	13000
Blackwood's	5000
Frazer's	3000
New Monthly	2000
Monthly	750
Gentleman's	2000
Ladies'	1800
Metropolitan	1250
Quarterly Review	8000
Edinburgh	3500
Westminster	2500
London's	2100
Philosophical	500
Monthly Review	500
Brande's Journal	600
Brewster's Journal	750
La Belle Assemblée	1000
Christian Observer	4000
The Lancet	4500

The following French Periodical Publications were sent daily, by the post, in February, 1831:—

DAILY.	*Subs.*
Moniteur	1224
Constitutionnel	15400
Debats	8882
Gazette de France	10019
Courier Français	3930
Le Temps	6596
Quoditienne	4810
Le National	2919
Le Messager	1328
Galignani's Messenger	1308
Commerce	1303
Gazette des Tribunaux	1279
L'Avenir	1688
Le Globe	1270
L'Echo Français	1154
Courier de l'Europe	750
PERIODICAL.	
Courier des Electeurs	2520
Journal de l'Enregistrement	1060
Journal des Maires	6374
Journal des Dames	1076
Petit-Courier des Dames	1771
Le Voleur	1111
Le Correspondant	1300
L'Echo des Halles	1030

The numbers circulated in Paris *about a third more.*

There are, by other accounts, in Paris, 152 journals, literary and religious; and 17 political. One hundred and fifty-one are liberal, having 107,000 subscribers; and, the other 18 have 21,000. There are 75 provincial journals, with 90,000 subscribers. In all, 244; with 317,000 subscribers.

Besides its intolerant censorship of books and writings, only two newspapers are printed in German at Vienna, one the Observer, the State Journal, conducted by one Pilate, and the Gazette, the Commercial and Official Advertiser. The police is a prying personal Inquisition on men and books.

Newspapers and periodicals are circulated in the United States, at 1 and 1½ centims each, and pamphlets per sheet, at 4 and 6 centims. In 1831, 237 papers were published in the State of New York, 16 of them daily. There

were 54 in New York, which in the year produced 9,536,000 sheets.

The first duty of a State is to provide for the instruction of the people. The most useful and essential of all contributions, is the contribution of knowledge.

The proportion of the population educated at schools:

In England	1 in 17
Wales	1 in 20
Scotland	1 in 9
Holland	1 in 10
Switzerland	1 in 8
France	1 in 28

Of 11,000 parishes in England, 3500 were, in 1820, without a school.

In 1818, there were in England 4167 endowed schools, 14,282 unendowed schools, and 5162 Sunday schools. The revenue of the endowed was 300,525*l.*, not, perhaps, a fourth of the true amount. At that time, the whole educated but 644,000 children.

The British and Foreign School Society have 86 schools in and round London, in which 14,000 children are educated. 1,500,000 children are educated at Sunday Schools in Great Britain, at a cost of 2*s.* each per annum.

The 50,000 schools, in Great Britain, consist of 30,000, aided by charitable funds; and 20,000 independent, in 10,000 of which no regular system is adopted; in 1000, the system of Bell and Lancaster is adopted.

The number of children receiving elementary education in England, in 1818, was near 1,100,000; and the returns, in 1828, make them about 1,500,000 of 2,000,000, between 5 and 12. The other 500,000 are presumed to receive education at about 10,000 independent schools, at 50 to each. But for education, the distressed circumstances of the country, since 1825, would have increased crime tenfold.

The first Infant School was opened by Mr. R. Owen, at New Lanark, in 1816, as an experiment, to teach children morals and facts, without theology. They are most admirable.

The system of infant schools embraces children just emerged from the nursery, and instruction is effected by toys and sensible objects, and by the patience and address of the tutoress.

Besides parish and district schools, there are, in London, numerous considerable schools for popular and useful education.

During 1830, 328 English National Schools had been received into union with the National Society, making a total of 2937 schools; and 6643*l.* had been voted in aid of building schoolrooms in 104 places. There cannot be less, in England and Wales, than 710,000 children receiving instruction under the care of the clergy.

Christ's Hospital, London, boards, clothes, and educates 1200 children.

The Foundation Schools of Harrow, Westminster, Merchant-Taylors, Saint Paul's, the Charter-house, Rugby, and some others have, deservedly, great celebrity; but the subjects of education are those of the age of Elizabeth!

The Number of Children educated at the great Public Schools is as under:—

Christ's Hospital	1200
Eton	500
Charter-house	400
Winchester	250
Westminster	250
Harrow	200

The National Schools, in the spring of 1830, educated 275,000 children; the Lancasterian, 53,000; and there were 5000 Sunday Schools, for 700,000 children.

There are three methods of acquiring knowledge,—first, by committing to memory in the manner of tasks, which usually are forgotten as soon as said by rote; second, reading books, which makes but a fleeting impression, and leaves only general ideas; and, third, answering, by original exercise, questions upon books, and on the facts and principles contained in them, by which the student is compelled to think for himself, and to evince his acquaintance with the subject. This is called the Interrogative system, and it has been applied to every subject of study with unequivocal success. The Interrogative system, by questions, *without* answers, is however to be carefully distinguished from the vulgar method of writing books in questions, *with* answers, by which no advantage is gained.

The system of Pestalozzi consists of oral questions, proceeding systematically from simple to complicated objects, and the answers are given orally. It is similar to the interrogative system, but does not possess the practical convenience and intellectual advantages which attend the writing of the answers, which act is a simultaneous exercise in spelling, grammar, and composition.

The Hamiltonian system, for teaching language, is similar to that developed in the little books bearing the name of the Abbé Bossut; both consider the words of a language as the primary objects to be learnt, and then the phrases or idiomatic construction.

The system of Bell and Lancaster is an appeal to the eye and memory, in small classes directed by monitors, who are the more forward children, and who perfect themselves while teaching the others, so that one master may thus superintend the economy and exercises of several hundred pupils; and it is

therefore a cheap method of teaching the mass of the juvenile population the first elements of knowledge.

The *interrogative system* of instruction, invented and introduced by the Editor of this work between 1798 and 1827, consists of text-books, and questions on the text-books, *without answers*, which are to be furnished in writing by the pupils; and Keys are printed to the questions for the ease of tutors.

The system of teaching languages by words, phrases, and grammar in consecutive succession, as in the nursery, was first published, in 1803, in elementary works, under the assumed name of the Abbé Bossut.

The University of Oxford is governed by a Chancellor, high-steward, vice-Chancellor, and 4 pro-vice-chancellors. There are 19 colleges and 5 halls, the oldest, University, having been founded in 1172; and, the last, Worcester, in 1714. The professors are 27; of whom there are 2 in divinity, 2 in Arabic, and 1 in the equivocal science of political economy.

Cambridge University consists of a Chancellor, high-steward, and deputy vice-chancellor, a commissary, public orator, librarian, 3 esquire bedels, 24 professors, 3 preachers, and curators of the Botanic Garden and Fitzwilliam Museum. It consists of 13 colleges and 4 halls. Peter-house was formed in 1257; and Downing in 1800.

Though St. Peter's, the oldest college at Cambridge, was founded in 1257, this was a place of education as early as the Romans, but revived in the reign of Henry I. The system of education still pursued, too much resembles that of the Popish and dark ages, and changes of system do not keep pace with improvements; so that in all such establishments students do not acquire the knowledge of their own age, but only that of a previous age, or of the tutors' tutors.

In 1750, the Oxford students were 190, and in 1820, 366. In 1748, those of Cambridge were 138, and in 1823 were 397.

There were, in 1828 9, on the books, at Oxford, 5163 members, of whom 2717 were students; and, at Cambridge, 5145, and 3088 students.

The Members of Convocation of Oxford, in Jan. 1831, were 2529; and the whole on the books, 5258; Christ-church, 951.

The following appear to be the number of the Members of our two Universities for the year 1832:

Oxford—Members of Convocation, 2510
Members on the books 5274

Cambridge—Members of the Senate 2179
Members on the books 5364

Cambridge for the first time had, this year, 90 more than Oxford, after exhibiting a progressive advance for several years. The cause is ascribed to the more liberal political character of Cambridge.

There has been an extraordinary increase in the members of this university since the middle of the last century, as is shown by the subsequent table:—

1748	1590
1813	2805
1825	4700
1830	5263

The number of Colleges at Oxford is 24, and that of the professors 28; whilst, at Cambridge, the number of colleges is only 17; and of the professors 24. But there are private teachers and tutors in the several colleges, who are efficient instructors.

Education at Cambridge, however, preceded the erection of colleges, which were munificent acts to relieve the students from the expence and inconvenience of living at private houses and at inns; but latterly, at Cambridge in particular, the colleges have overflowed, and a large proportion of the students have resided in private lodgings, under the controul and direction of the college. The oldest college, at Cambridge, is

St. Peter's	Built in 1257
Clare-hall	1326
Pembroke-hall	1343
Bennett's	1356
Caius	1348
Trinity-hall	1400
King's College	1411

The splendid chapel of this college is 316 feet long, and 86 broad, with towers 146 feet high, and a dome, with painted windows, 50 feet high.

Christ's College	1442
Queen's College	1448
Catharine-hall	1475
Jesus' College	1497
St. John's College	1516
Magdalen College	1542
Trinity College	1546
(The largest in the university.)	
Emanuel College	1584
Sydney College	1600
Downing College	1800

There are also, at Cambridge, a splendid senate-house, library, public schools, and a museum. There are 410 fellows—70 to King's, 61 to St. John's, and 60 to Trinity. It was a seat of education before the conquest.

Christchurch, Oxford, is the most splendid establishment of its kind.

The foundations were as under:—

University College	1172
Baliol College	1263
St. Edmund-hall	1269
Merton College	1274
Exeter College	1316
Oriel College	1325

St. Mary-hall	1333
Queen's College	1340
New College	1375
New-inn-hall	1392
Lincoln College	1427
All Souls' College	1437
Magdalen College	1449
Brazen Nose College	1511
Corpus Christi	1516
Christ Church College	1532
St. Alban-hall	1547
Trinity College	1555
St. John's College	1557
Jesus' College	1571
Magdalen-hall	1602
Wadham College	1613
Pembroke College	1620
Worcester College	1714

There are 28 professorships and 4 terms—10 weeks, 5 weeks, 5 weeks, and 9 weeks. There is a chancellor, high-steward, vice-chancellor, 4 pro-vice-chancellors, a deputy-steward, public orator, 2 proctors, 4 pro-proctors, 3 esquire bedells, &c. &c.

Cambridge has 1200 doctors and masters of arts.

Oxford—The same.

SCOTLAND has Universities at Edinburgh, Glasgow, St. Andrew's, and Aberdeen; all in high repute.

St. Andrew's, Aberdeen, founded in 1410, has two colleges, St. Salvator's and St. Mary's, for divinity only. Its students are 150.

Nearly 3000 students per annum attend the University of Edinburgh, where education and knowledge are acquired in the highest degree of perfection. Its professors for half a century have been the most distinguished literati of the age.

Between 1800 and 1830, the University of Edinburgh granted 199 degrees in arts and 2524 in medicine. Glasgow 712 in arts and 410 in medicine. St. Andrews 59 and 649.—*Marshal.* Aberdeen 1018 and 282; and King's 740 and 286. In all, 4151 in medicine and 2728 in arts, or 230 per annum.

The following is the number of degrees granted by each of the Scottish Universities in the last 31 *years*:—

	D.D.	LL.D.	A.M.	M.D.
Edinburgh	46	27	199	2,524
Glasgow	87	72	760	654
St. Andrew's ...	69	6	59	649
Aberdeen	26	59	740	286
Marischal	31	50	881	282

The University of Dublin, or Trinity College, has produced some learned men. It consists of a provost, 7 senior, 18 junior fellows, and 70 foundation scholars. It has usually about 2500 students, and possesses a library 207 feet long, containing nearly 80,000 books.

The Royal College of Maynooth has 9 professors; 1 of dogmatic theology, 1 of moral theology, 1 of sacred scripture, and 1 of Irish.

Gresham College, sadly deteriorated, has 7 professors of branches of ancient learning, who lecture in term-time. It is under the direction of 12 of the corporation of London.

There are endowed Colleges at Dulwich, Eton, St. Bee's, St. David's, and Winchester; besides the Military, Naval, East India, and Sion; and Elizabeth, in Guernsey.

Two new colleges, on the plan suggested by Defoe, have recently been established in London, one called the London University, near Tottenham Court; and, the other, King's College, in one wing of Somerset-house. The first is more particularly supported by the Dissenters, and the second by the High Church; but they are experiments on the population of a metropolis, and are not yet fully matured.

Universities, like societies, are favourable only to the propagation of the knowledge of the previous age, or ages, and to the perpetuity of established opinions. In general, too, as the dead languages were the language of literature when the first universities were founded in the 13th century, so, by precedent and usage, they continue their studies in those languages at a time when all knowledge out of their walls is in living languages. They preserve, too, the studies and cast of opinions which were enacted at the era of their foundation, and usually proscribe all improvements and discoveries as dangerous innovations.

Bishop Watson relates that the University of Cambridge, in Nov. 1764, elected him professor of chemistry, "Though, at the same time, I knew," says he, "nothing at all of chemistry, had never read a syllable on the subject, nor seen a single experiment in it." Yet 1764 is described by the Quarterly Review (Nos. 35, 235) as the Augustan age of that university.

The University of Gottingen, now deservedly famous, was founded by George II. in 1735. It has thirty-six professors, many of whom are constantly at the European head of their branch of learning. Gauss, Bluomenbach, Hugo, Eickhorn, Tyschen, Hieren, and Sartorius, are contemporary professors. The library contains 200,000 useful books. Gottingen had 913 students in Jan. 1832.

Austria has 8 Universities, containing 870 professors and 20,603 students of all grades.

In 1828 the University of Berlin had 1706 students.

There are 400 students at the University of Kiel.

In the Russian universities there are students:—Moscow, 891; Dorpat, 612; Helsingfoers (late Abo), 471; Charkoff,

318; Wilna, 303; St. Petersburgh, 311; and Kasan, 81. The ecclesiastical high schools, attached to the Greek church, are those of Kioff, Moscow, and St. Petersburgh, of which the first possesses 1500, the second 630, and the last 830 scholars. The whole of the students throughout the Russian empire are therefore 5957 in number.

The University of Cracow was abolished by the jealousy of Austria, in 1806; and more supple ones founded at Leopol and Warsaw, in 1832.

The Temple, London, was founded in 1185; Lincoln's-inn, in 1310; and Gray's-inn, in 1357.

The Royal Society of London is governed by a president and 18 council, with about 1000 members. The Royal Society of Edinburgh has a president, five vice-presidents, and literary and physical councils.

The Antiquaries Society was established in 1751; and there is another in Scotland, 1780.

The Royal College of Physicians, founded in 1523, has a president, 96 fellows, about 18 candidates, and about 320 licentiates. The Royal College, at Dublin, 33 fellows and 60 licentiates. That of Edinburgh (1681), about 100 fellows, of whom a third are resident.

The College of Surgeons is governed by a president, 20 vice-presidents, 7 curators, and 4 professors, with officers.

The British Museum is governed by 23 official trustees, 9 of the families of donors, and 14 elected. There is a principal librarian, and 14 keepers and assistants. The number of visitors per annum is about 50,000.

The Literary Fund was established in 1790, for the eleemosynary relief of very destitute authors.

The Asiatic Royal Society was incorporated in 1824, for literary and scientific purposes.

The Institution for Improving and Exploring Africa was formed in 1807; and there is also an African and Asiatic Society, with religious objects.

There is an Anti-Slavery, of which the Duke of Gloucester is patron.

The Horticultural Society of London was founded in 1808, and has been eminently useful in naturalising foreign plants and improving gardening. There is another at Edinburgh, and others in nearly every county.

The total number of visitors to the Horticultural Gardens, in 1830, was 224,745. But this is exceeded by the visitors to the Zoological Gardens, in the Regent's-park and at Walworth, often 1500 per day to each.

The Garden of Fromont, six leagues from Paris, contains 130 acres, and more than 6000 species and varieties of vegetables, many of them still new in France. Some of the green-houses are 2000 feet in length, with glazed roofs, possessing all varieties of exposure.

The Athenæum, in Waterloo Place, is a club of distinguished amateurs of literature.

There are collegiate public schools on obsolete plans of instruction, at Eton, Westminster, Winchester, Harrow, Charter House, St. Paul's, Christ Hospital, Merchant Taylors' Hall, Reading, Rugby, Repton, Manchester, Shrewsbury, Guernsey, Dulwich, St. Bee's, St. David's, and Haileybury.

There are colleges at Calcutta, Barbadoes, Windsor, Nova Scotia; and York, Upper Canada.

In 1832, a University was founded at Durham, by the bishop.

There are 450 endowed Grammar Schools scattered over England and Wales; but, as above 400 of them were founded in the 16th century, and the monkish and obsolete learning of that age is prescribed by their statutes, they are for the most part *utterly useless* to the population, and *a standing libel* on the legislation, which has so long tolerated their inefficiency and gross misapplication of nearly two millions per annum.

The degrees, with honours, at Oxford, are granted to four classes In Literis Humanioribus and In Disciplinis Mathematicis et Physicis. At Cambridge, in mathematics, as wranglers, senior and junior optimes, and in classics in three classes.

The following is the Date of the Origin of several famous Institutions.

Academia della Crusca, was founded in	1582
——— del Cimento	1610
——— Bononiensis	1690
L'Academie Françoise	1635
——— de Peinture et de Sculpture	1648
——— des Inscriptions et Medailles	1663
——— R. des Sciences (Institute)	1666
R. Academy of Sciences, at Berlin	1700
Royal Society of London	1665
R. Spanish Academy	1714
R. Academy of Sciences, at Lisbon	1779
——— Petersburgh	1725
——— Stockholm	1741
——— Copenhagen	1742
The American Academy, Boston	1779
The Royal Irish Academy	1782
The Academy of Ancient Music	1710
The Royal Academy of Arts	1768
R. Military Academy, Woolwich	1741

The French Academy was created by Louis XIII. in 1635. Its original pursuits were Eloquence and Poetry. In 1648, it was extended to the Fine Arts;

and, in 1666, by Colbert, to the Arts and Sciences.

The following is a list of the principal Literary Societies in the United Kingdom, with the fee on admission, according to Babbage, and the initial letters distinguishing the members :—

Royal Society, 50*l.*, F.R.S.
Royal Society of Edinburgh, 25*l.* 4*s.*, F.R.S.E.
Royal Academy of Dublin, 26*l.* 5*s.*, M.R.I.A.
Royal Soc., Literary, 36*l.* 15*s.*, F.R.L.
Antiquarian Society, 50*l.* 8*s.*, F.A.S.
Linnæan Society, 36*l.*, F.L.S.
Geological Society, 34*l.* 13*s.* F.G.S.
Astronomical Society, 25*l.* 4*s.*, M.A.S.
Zoological Society, 26*l.* 5*s.*, F.Z.S.
Royal Institution, 50*l.* M.R.S.
Royal Asiatic Soc., 31*l.* 10*s.*, F.R.A.S.
Horticultural Society, 48*l.* 6*s.*, F.H.S.
Medico Botanical, 21*l.*, F.M B.S.

In 1827, only 109 of the 1150 F.R.S. had contributed to the Transactions; and, of these, 11 only had titles of rank.

There are, in the United Kingdom, 112 public libraries, or collections of books and records.

The Royal Library, presented in 1822 to the British Museum, consisted of 65,250 books, besides pamphlets. The previous Museum Library was 110,000 vols. consisting of Sloane's, Harley's, Hargrave's, Burney's, and Banks's libraries, besides Lansdown MSS., &c. &c.

It has been stated, that the six largest libraries in Europe contain the following number of volumes and MSS. :—

	Volumes.	MSS.
Royal Library of Paris	450,000	77,000
Bodleian, Oxford	420,000	30,000
Munich University	400,000	9,000
Vatican, at Rome	100,000	40,000
Gottingen University	300,000	5,000
British Museum	180,000	120,000

Besides the Museum, there are the under-mentioned in England :— Cambridge University; Advocates', Edinburgh; Sion College; and Dublin University; and, in London, the Library of the Royal Institution, the London Institution, and five or six others.

The Advocates' library, at Edinburgh, contains 100,000 volumes, besides ancient MSS., and a cabinet of scarce and valuable medals.

The public libraries of Paris, open daily to all classes, contain nearly a million of volumes, besides 100,000 MSS.

Lope de Vega wrote, with great ability, at least 500 plays, nearly as many sacred dramas, and as much poetry. He himself claimed 1500 plays, and some Spaniards say it was 2200. Each contains about 3000 lines; and he says that he wrote five sheets every day for above 60 years.

Macedo, a Portuguese dramatist, printed 106, and left 31 MS. plays.

Mariner, a friend of Lope, wrote nearly as many. Lope was in the Spanish Armada, an extoller of the Duke of Alva, and he wrote a poem, traducing Drake as a dragon dealing with the devil, and Elizabeth as a harlot, &c.

Corneille, Racine, Moliere, Voltaire, and Beaumarchais, are the dramatists of France; Frissino, Tasso, Guarini, Maffei, Metastasio, and Alfieri of Italy; Cervantes, Lope de la Vega, and Calderon, of Spain; Lessing, Gœthe, Iffland, Kotzebue, [redacted], Schiller, &c. are the dramatists of Germany. England boasts of Shakspeare, Fletcher, Massinger, Dryden, Otway, Addison, Steele, Farquhar, Congreve, Young, Foote, Sheridan, Murphy, O'Keefe, Holcroft, Knowles, &c.

A dramatic author, in France, is entitled, on every performance, in Paris, to 10 francs per act, and to 5, 3, and 2 francs, in country theatres, scrupulously collected by a board for the purpose.

Du Bartas's Poem on the Creation, written late in the 16th century, and called the Divine Week, was as popular a poem as ever appeared. It ran through 30 French editions, in 5 or 6 years, and was immediately translated into 5 languages, passing through several editions in each.

Walter Scott's novels uniformly exhibit a passive hero, who is to marry the heroine; a fierce hero, who is to die a violent death; and a fool, or bore, who is to exhaust one fund of humour. His characters are superior to his plots, his humble to his high life, his Scotland to his England, &c.; his tragedy to his comedy, and his early to his latter works.—*Q. Review*, 54.

The English and even the improved French versions of *the Arabian Nights* are miserably defective. A complete version from oriental MSS. has, however, appeared at Breslau, by Habicht, Hagen, and Schall, in 15 vols. 12mo. with new information about their origin. They are referred to the Sultana *Sheherazade*, who told them as related to Sultan *Schahriar*, and, after two years and nine months, led him to withdraw his anathema against his wives. The Persians have an imitation in 1,001 *days*, but very inferior to the fascinating original.

Chaucer had for contemporary poets, Robert of Gloucester, Robert of Brunne, and Piers Plowman, believed to be a fictitious name. Their predecessors were Kendale, and Thomas of Erceldown.

Akenside, our classical British poet, left the world the following analysis of the merits and qualities of great poets.

	Critical Ordonnance.	Pathetic Ordonnance.	Dramatic Expression.	Incidental Expression.	Taste.	Colouring.	Versification.	Moral.	Final Estimate.
Ariosto	—	15	10	15	14	15	16	1)	13
Boileau	18	16	12	14	17	14	13	16	12
Cervantes . .	17	17	15	17	12	16	—	16	14
Corneille . . .	15	16	16	16	16	14	12	16	14
Dante	12	15	8	17	12	15	14	14	13
Euripides . . .	15	16	14	17	13	14	—	15	12
Homer	18	17	18	15	16	16	18	17	18
Horace	12	12	10	16	17	17	16	14	13
Lucretius . . .	14	5	—	17	17	14	16	—	10
Milton	17	15	15	17	18	18	17	18	17
Moliere	15	17	17	17	15	16	—	16	14
Pindar	10	10	—	17	17	16	—	17	13
Pope	16	17	12	17	16	15	15	17	13
Racine	17	16	15	15	17	13	12	15	13
Shakspeare . .	—	18	18	18	10	17	10	18	18
Sophocles . .	18	16	15	15	16	14	—	16	13
Spenser . . .	8	15	10	16	17	17	17	17	14
Tasso	17	14	14	13	12	13	16	13	12
Terence . . .	18	12	10	12	17	14	—	16	10
Virgil	17	10	17	17	18	17	17	17	16

The estimates stand thus :—

CRITICAL ORDONNANCE.

First Class. Homer, Sophocles, Terence, Boileau.
Second. Virgil, Tasso, Milton, Racine.
Third. Pope.
Fourth. Euripides, Corneille.
Fifth. Lucretius.
Sixth. Horace, Dante.
Seventh. Pindar.
Eighth. Spenser.

PATHETIC ORDONNANCE.

First Class. Shakspeare.
Second. Homer.
Third. Sophocles, Euripides, Corneille, Racine.
Fourth. Dante, Ariosto, Spenser, Milton.
Fifth. Tasso.
Sixth. Terence, Horace.
Seventh. Pindar, Virgil.

DRAMATIC EXPRESSION.

First Class. Homer and Shakspeare.
Second. Virgil.
Third. Corneille.
Fourth. Sophocles, Milton, Racine.
Fifth. Euripides, Tasso.
Sixth. Boileau, Pope.
Seventh. Terence, Horace, Ariosto, Spencer.

INCIDENTAL EXPRESSION.

First Class. Shakspeare.
Second. Euripides, Pindar, Lucretius, Virgil, Dante, Milton, Pope.
Third Class. Horace, Spenser, Corneille.
Fourth. Homer, Sophocles, Ariosto, Racine.
Fifth. Boileau.
Sixth. Tasso.
Seventh. Terence.

TASTE.

First Class. Virgil, Milton.
Second. Pindar, Terence, Lucretius, Horace, Spenser, Boileau, Racine.
Third. Homer, Sophocles, Corneille, Pope.
Fourth. Ariosto.
Fifth. Euripides.
Sixth. Dante and Tasso.
Seventh. Shakspeare.

COLOURING.

First Class. Milton.
Second. Virgil, Horace, Shakspeare, Spenser.
Third. Homer, Pindar.
Fourth. Dante, Ariosto, Pope.
Fifth. Euripides, Sophocles, Terence, Lucretius, Corneille, Boileau.
Sixth. Tasso, Racine.

VERSIFICATION.

First Class. Homer.
Second. Virgil, Spenser, Milton.
Third. Lucretius, Horace, Tasso, Ariosto.
Fourth. Pope.
Fifth. Dante.
Sixth. Boileau.
Seventh. Corneille, Racine.

Eighth.	Shakspeare.

Sophocles, Euripides, Pindar, and Terence are not numbered.

MORAL.

First Class.	Shakspeare, Milton.
Second.	Homer, Pindar, Virgil, Spenser, Pope.
Third.	Sophocles, Terence, Corneille, Boileau.
Fourth.	Euripides, Racine.
Fifth.	Horace, Dante.
Sixth.	Tasso.
Seventh.	Ariosto.

FINAL ESTIMATE.

First Class.	Homer, Shakspeare.
Second.	Milton.
Third.	Virgil.
Fourth.	Corneille, Spenser.
Fifth.	Pindar, Sophocles, Horace, Dante, Ariosto, Racine, Pope.
Sixth.	Euripides, Tasso, Boileau.
Seventh.	Terence, Lucretius.

Galileo, a higher authority than Akenside, used to say that reading Tasso after Ariosto, was like eating cucumbers after melon.

Since Akenside we have had Burns, Byron, Cowper, Wolcot, &c. &c. to add to the previous analysis. France and Germany have also made additions in Delille, Goethe, Klopstock, and Schiller.

Robert of Gloucester, Robert of Brunne, and Piers Plowman, were respectable Poets, anterior to Chaucer, but in barbarous old English.

Tutbury Castle, celebrated in Robin Hood, was in Needwood forest, and one of the most celebrated of baronial residences. The pantry alone, in the age of Edw. III. cost 4,000*l*. per annum.

The record commissioners for reprinting ancient MSS. and records, &c. in the public offices, have expended in 20 years 546,000*l*. in printing 1,000 copies of sundry works, for which the demand is so little, that not the odd 6,000*l*. has been received for sales. 120 copies are given to public libraries and establishments, and much curious matter has been rescued, but the great expence has created much animadversion.

The *Bibliomania*, like the Tulipmania in Holland, became too ridiculous to last. It was finally written down by Dibdin, one of the leaders of this infatuated sect. They valued books in the inverse ratio of their intrinsic worth, and any peculiarity, even a printer's blunder in a copy, raised its value 500 per cent. First editions, with all their imperfections, were often worth a freehold estate, and a dealer was in danger of ruin if a second copy by chance came into the market; and all this took place while current literature languished, and hundreds of able writers were starving.

Rymer's Fœdera is a collection of State papers and records, relating to foreign affairs, published by authority in the reign of Anne.

The Nautical Almanac, the *Connaisance des Tems*, and the *Astronomisches Jahr-buch* of Berlin, have all the same objects.

Regiomontanus made the first Almanack in 1474.

The largest impressions of any single book were those of Moore's Almanack, a proof of the prevalence of superstition. For many years, during the late wars, when political excitement was excessive, the Stationers' Company sold from 420 to 480 thousand copies per annum of Moore's Astrological Prophecying Almanack. About 50 years since, the Company resolved no longer to administer to this gross credulity, and, for two or three years, omitted the predictions, when the sale fell off one half; while a prognosticator, one Wright, of Eaton, near Woolstrope, published another, and sold 50 or 60,000. To save their property, the Company engaged one Andrews, of Royston, also a native of Woolstrope, to predict for them, and their sale rose again as above. The Company have three or four prophesying almanacks, and three or four of rational and scientific character; but the sale of the former is, to that of the latter, as twenty to one.

Gilles de Retz, or Laval, was the original Blue Beard of Perault. He resided at Machecoul in Brittany, and was marshal of France. He was charged with murdering several wives, and above 100 children, and with sorcery, and burnt at Nantes, in December, 1440.

Spenser was born in East Smithfield, Pope in Lombard-street, Gray in Cornhill, Chaucer and Milton in Bread-street.

Posting-bills were so called because originally they used to be affixed to the street-posts. Play-bills were printed in the age of Elizabeth.

The term *Blue Stocking*, applied to literary ladies, was conferred on a society which was called the Blue Stocking Club, in which females were admitted; and so called owing to a Mr. Benjamin Stillingfleet, one of its acting members, always wearing blue stockings.

The sale of the Spectator was above 3000 per day; Tickell says, sometimes 20,000. It was ruined by a half-penny stamp, which raised the price from 1*d*. to 2*d*.

The Tatler was commenced in 1709.

the Spectator in 1711, the Guardian and Englishman in 1713, the Freeholder in 1715, the Rambler in 1750, the Adventurer in 1752, the World 1753, the Connoisseur 1754, the Idler 1758, the Observer 1786. They appeared two or three times a week, in foolscap folio.

Hogarth's prints, of the industrious and idle apprentices, were founded on an old comedy, called "Eastward Hoe," in which are found the same characters and incidents.

Sir Walter Scott's Meg Merriiies was Jean Gorden, of Yetholm. She was detected stealing some shoes at Wooler Fair, and, being ducked in the river, she died the same night, of the injuries she received.

Pope translated the Iliad in a tower at Stanton Harcourt, near Oxford. His Essay on Man, he wrote in a little room adjoining the Thames, at the back of Lord Bolinghroke's House, at Battersea.

Shakspeare's Romeo, was Romeo Monteccheo, and Juliet was Juliet Capello. Bandello gives the story as true, and till lately their tomb was shewn at Verona.

The *Contes des Fées*, in 50 or 60 vols. were the production of the Countess D'Aunoy, who lived from 1650 to 1705. Few of them have yet appeared in English.

The first edition of Boccacio, printed in 1471, sold at the Duke of Roxburgh's sale for 2260*l.*, and in celebration of the folly of the purchaser, the Roxburgh Club of biblio-maniacs was founded.

There are about 800 booksellers and book dealers, in and round London, besides newsmen and itinerant venders in equal number. Then there are from 6 to 8 in 100 county and large towns; 2 or 3 in 300 smaller towns, and 25 each in Birmingham, Bristol, Bath, Liverpool, Manchester, and Glasgow, besides 50 in Edinbro' and Dublin, in all about 2500 traders, 2000 of whom have accounts with wholesale houses in London, and on the average each of them receives a parcel of 5*l.* value every week. Fifty years ago the number was not one fifth, and not above 1 in 10 received a London parcel oftener than once a month. It is this difference which leads the Editor of this volume to announce a *weekly* miscellany, with more confidence of extensive success, than he had, 38 years ago, in announcing a monthly one.

The editions of books run by two hundred and fifties, every 250 being the mode of charge by printers. Few books pay for setting the types at less than 500, which, therefore, is the common edition of ordinary books. Others run 750, 1,000, or 1,500. School-books and others, in small type, demand 2 or 3,000. And, of many modern school-books, under the names of Blair, Goldsmith, Barrow, &c. 10 or 15,000 have been printed per annum for a series of years. Of Paine's Rights of Man, 150,000 were sold within twelve months; and 30,000 of Burke's Reply. In France, editions are larger than in England, owing to the demand in foreign countries. Three-fourths of the books printed do not pay their expenses; and not above one in ten realizes a profit.

The destruction of public credit by the Liverpool administration, and the abstraction of the currency by the political economists, when the country was 5,000 millions in debt, in the pre-existing currency, had had the same effect on books as on cottons, silks, woollens, &c. *Slights*, which can be sold cheap, alone suit the public means, and we have in consequence sunk even from the *despised* "two-penny trash" to the *fashionable* penny worth, in all the forms which ingenuity of manufacture can suggest. Calicoes at three-pence per yard, and books at a *penny* seem to be signs of national decadence.

Trade in books has multiplied them in modern times. There are now printed, annually, about 1,000 books and pamphlets in the United Kingdom, besides 120 periodicals twelve times a year; 20 others, 52 times; 12 quarterly, and 300 several newspapers. In France, the new books and pamphlets are about 1,500 per annum.

Books and paper were formerly sold only at stalls, and the dealers therefore were called *Stationers*.

The modern names of sizes of books are derived from the folding of paper; when the sheet is not folded it is called a folio, and this size was very fashionable through the 16th and 17th centuries. The folio sheet doubled, becomes a quarto, and this has been thought the most convenient form; another double constitutes the octavo, of eight leaves, or 16 pages; another double, the square 16mo. The sheet folded into 12 leaves, is called a duodecimo; into 18, an octodecimo or 18mo.; and then, doubled again, becomes a 24mo. or 36mo.

A ream of paper is 18 quires, of 24 sheets, and 2 quires of outsides, of about 20 torn sheets. But a printer's ream is 21½ perfect quires, or 516 sheets, producing 510 or 512 books.

A volume of 20 sheets costs in Germany, for 1,000 or two reams per sheet, 16*l.* 10*s.* for paper, and 13*l.* 10*s.* for printing; other expences various. The same volume in England would cost 45*l.* for paper, and 42*l.* for printing, besides advertizing 25*l.* *i. e.* 112*l.* instead of 30*l.* taking engraving, author, &c. as equal in each country.

In 1830 there were 31 periodicals in Bengal; 8 in the native tongue. At Madras 5 English, and at Bombay 4.

An Armenian newspaper is published at a monastery near Venice, and much read through the Levant.

In France, the copy-right of an author lasts for his life, and to his family 10 years after his death. In the United States it is 14 years, and then reverts to the author for a second 14, as it ought.

FISCAL.

BRITISH EXCHEQUER.

The gross receipts of the CUSTOMS for Great Britain, in 1831, were 18,168,491*l*., and of Ireland 1,477,448*l*.

The gross receipts of the EXCISE for Great Britain, 16,900,264*l*. and for Ireland, 2,193,079*l*.

The POST OFFICE of Great Britain, 2,064,335*l*., and Ireland, 256,977*l*.

The STAMPS for Great Britain were 6,945,559*l*. and Ireland 482,041*l*.

The ASSESSED TAXES in Great Britain were 5,228,937*l*., but Ireland is not annoyed with assessed taxes.

The TOTAL EXPENDITURE of the United Kingdom in 1831 was 51,711,465*l*., and the deficiency of revenue was 778,032*l*.

The Gross receipts of CUSTOMS on 100 imported articles, yielding above 4,000*l*. for Great Britain, were in 1831-2:

ACID, Boraccic	£5,170
Almonds	17,345
Apples	10,733
Ashes	7,116
Balsams	5,451
Barilla	17,129
Bark, &c.	27,106
Beer, Spruce	6,931
Books	9,213
Brimstone	7,004
Bristles	26,434
Butter	121,337
Cheese	68,338
China, &c.	5.135
Clocks	6,240
Cloves	8,007
Cocoa, Chocolate	12,700
Coffee	559,968
Cork	16,174
Corn and Grain	551,954
Currants	329,340
Dye—Mahogany	46,318
—— Rosewood	8,484
Eggs	20,389
Embroidery	5,940
Feathers for beds	4,667
Figs	21,738
Fish, Anchovies	7,771
Furs	28,792
Glass bottles	10,335
—— other sorts	5,526
Gum-lac	5,937
Gum, Senegal	6,113
Hats, Chip and Straws	26,539
Hemp	111,113
Hides, untanned	£32,650
Indigo	31,747
Iron in bars	19,657
Isinglass	4,049
Leather gloves	21,970
Lemons and oranges	64,077
Linens, foreign	21,780
Liquorice juice	21,944
Madder	18,637
Molasses	156,957
Nutmegs	18,872
Nuts, small	10,650
Oil, castor	4,111
Oils, prepared	7,571
Oil, olive	63,404
Oil, palm	21,987
Opium	5,167
Pepper	93,747
Pimento	6,189
Platting straw	13,321
Prunes	10,358
Quicksilver	4,792
Raisins	169,335
Rhubarb	5,183
Rice	11,172
—— in husk	25,743
Saltpetre	4,148
Sarsaparilla	6,134
Seeds and tares	149,532
Senna	7,939
Shumac	6,106
Silk, raw	12,729
—— thrown	82,997
—— E. India manufacturers	24,334
—— not E. India ditto	140,392
Skins	18,677
Smalts	8,392
Spelter	10,231
Spirits, Rum	1,622,131
——— Brandy	1,378,692
——— Geneva	25,344
——— other sorts	9,225
Guernsey, &c.	7,613
Sugar	5,346,128
Tallow	138,558
Tar	7,501
Timber,—Battens	107,205
——— Deals, &c.	506,213
——— Lath-wood	26,605
——— Masts, &c.	14,940
——— Oak plank	8,477
——— Staves	48,234
——— Teake	12,840
——— Fir	462,667
——— Oak	30,334
——— other sorts	5,837
——— Wainscot logs	7,286
Tobacco	2,343,846
Turpentine	65,324
Valonia	7,225
Verdegris	4,506
Water, Cologne	4,442
Wax, bees	10,304
Wines	1,401,593
Wool, cotton	364,253
—— sheep, &c.	113,776
Woollen manufactures	11,085
Total of above, and all other imports	17,824,586

The Drawbacks are	£1,276,007
Repayments on over entries, damages, &c.	48,558
DUTIES ON EXPORTS.	
Coals and culm	55,153
Wool and yarn	2,409
Per centage on all goods	58,933
DUTIES COASTWISE.	
Coals and culm	77,184
Slates	2,001
Drawbacks on coals	11,751
——— on slates	234

Ninety-two of the 100 above are mere articles of home consumption, or luxury.

The IRISH Barilla duties, gross, are 7,906*l.*; Bark, 5,582*l.*; Coffee, 24,220*l.*; Corn and Grain, 3,779*l.*; Hemp, 4,020*l.*; Lemons and Oranges, 3,366*l.*; Pepper, 9,268*l.*; Raisins, 4,852*l.*; Seeds, 4,542*l.*; Rum, 8,545*l.*; Brandy, 9,926*l.*; Sugar, 432,286*l.*; Tallow, 7,053*l.*; Deals, 29,661*l.* Timber, 51,259*l.*; Tobacco and Snuff, 626,795*l.*; Valonia, 3,093*l.*; Wines, 180,018*l.*; Cotton Wool, 3,888*l.* Total duties of imports, 1,456,219*l.* Duties coastwise, 8,856*l.*; and outwards, 1,420*l.*

The net produce, in 1831-2, of the articles of Excise, was for Great Britain

Auctions	£208,215
Bricks and tiles	365,238
Candles	470,659
Glass	516,374
Hops	148,595
Licenses	793,890
Malt	4,136,857
Paper	656,943
Printed goods	58,968
Soap	1,138,263
Spirits, British	3,413,431
Starch	78,805
Stone bottles	3,054
Sweets and mead	2,267
Vinegar	18,905
Tea	3,344,914

The net produce for England is 13,223,298*l.*, and for Scotland only 2,132,081*l.*, and for Ireland 2,184,271*l.*; of which, 1,781,694*l.* is for spirits.

The Duke of Grafton receives a pension out of the Excise of 9000*l.*, Earl Cowper 2000*l.*, the representatives of the Earl of Bath, half 3000*l.*

The Stamps for Great Britain, in net produce, were in 1831 as under:

Deeds, &c.	£1,388,348
Probates and letters	803,403
Bills of exchange	466,095
Banker's notes	34,206
Comp. Bank of England	75,263
Receipts	200,425
Marine insurances	220,395
Licences and certificates	154,149
Newspapers, &c.	451,658
Almanacs	28,040
Medicine stamps	31,630
Legacy	£1,138,467
Fire insurances	762,221
Plate	74,289
Cards	14,400
Dice	2,221
Pamphlets	941
Advertisements	156,899
Stage-coaches	422,481
Post-horses	231,863
Race-horses	1,318
Penalties and costs	2,514
Total	6,664,295

England alone produces 6,146,657*l.*, and Scotland alone 517,637*l.* Ireland alone yields but 474,345*l.*; of which, 31,496*l.* is for newspapers, and 15,672*l.* for advertisements.

England produces 409,965*l.* for newspapers, and 392,712*l.* for advertisements; and Scotland but 41,693*l.* for newspapers, and 29,769*l.* for advertisements; hence, England, for four times the population, reads ten times the papers of Scotland; and, for twice the population, reads thirteen times the papers of Ireland.

There was, in 1831, a decrease of 6¾ millions of thousands of bricks and tiles, below the average of three preceding years.

The Assessed Taxes produced, in 1831, in Great Britain—

Windows	£1,178,344
Houses	1,357,040
Servants	295,112
Carriages	392,947
Riding horses	356,357
Other horses	61,484
Dogs	181,002
Horse dealers	13,543
Hair powder	14,377
Armorial bearings	54,880
Game duties	125,431
Composition ditto	25,909

Total, 5,219,171; for Scotland alone, but 314,444; or one-sixteenth throughout.

An arrear of Property Tax was received of 1953*l.*, and of Income Duties 1378*l.*, both which expired 16 years ago; but in regard to which, Boards of Commissioners are still paid salaries of 600*l.* each!

The milage to mail-coaches, wages to guards, &c. cost 70,540*l.* The tolls paid were 15,098*l.*

Pensions out of the post-office revenue are paid to the Duke of Marlbro' of 5000*l.*, the Duke of Grafton 4700*l.*, and the heirs of the Duke of Schomberg of 4000*l.*

The two-penny post of London yields 110,433*l.*; the ship-letters, &c. 565,326*l.*, the London and Edinburgh letters, 524,873*l.*; and the cross-road letters,

671,680*l*. The passage-money, and freights by packets, 48,470*l*.

In 1664, the post-office produce was 21,000*l*.; in 1723, 201,804*l*.; in 1793, 607,268*l*.; in 1816, 2,007,940*l*.; and from July 1831 to July 1832, 1,346,000*l*.

Canal and dock duties .	£50,174
Isle of Man duties .	21,860
Goods sold for duties .	15,740
Rent of quays, &c. .	13,567
Surcharges, old stores, &c.	13,501

The taxes of the United Kingdom, in 1831, were collected at 0*l*. 13*s*. 3½*d*. per cent. The post-office was 28*l*. 7*s*. 2½*d*., and the hackney-coaches and pedlers 17*l*. 4*s*. 9½*d*.; but the stamps only 2*l*. 9*s*. 10*d*. The Customs were nearly the average, or 6*l*. 14*s*. 2*d*.; the Excise 5*l*. 18*s*. 7*d*. The gross receipts were 54,381,234*l*., and the payments into the Exchequer 46,424,441*l*. from Jan. 5, 1831, to Jan. 5, 1832, for the United Kingdom.

For Ireland separately, the gross receipts were 4,431,559*l*., and the payments into the Exchequer 3,759,839*l*.; the charges being 12*l*. 12*s*. 6*d*. per cent., the General Post-Office 32*l*. 11*s*. 9½*d*., and the Customs 17*l*. 17*s*. 4½*d*.

The net public Revenue of the United Kingdom, from April 5, 1831, *to April* 5, 1832, *was as under :*

Customs . . .	16,275,243
Excise . . .	16,516,632
Stamps . . .	7,019,145
Assessed taxes . .	4,088,414
Post-office . . .	1,559,206
Pensions and salaries .	28,111
Hawkers and pedlars .	54,543
Surplus fees . .	33,474
King's revenues . .	4,075
Irish fees, &c. . .	3,950
Imprests, &c. . .	32,331
East India Company .	60,000
Unclaimed Dividends .	41,804
	£46,618,016

The following was the EXPENDITURE in the same time.

Charges on debt .	28,343,811
Civil list and government	1,741,384
Army, navy, ordnance .	14,872,804
Miscellaneous expences	2,900,430
	£47,858,429
Excess over income	1,240,413
	£46,618,016

The cash and ACCOMMODATION BILL account of the British Exchequer, stood on April 5, 1831, as follows :

Balance in hand . .	1,799,300
Exchequer or accommodation bills . .	31,853,450
	£33,652,759

The payments to April 1832, were

Reduction of debt . .	479,078
Old bills paid off . .	29,339,400
Four per cent. dissentients .	160,000
Balance of advances, & repayment on public works	238,823
Excess of expenditure .	1,240,413
Balance in hand, 1832 .	2,195,045
	£33,652,759

Hence, the balance in hand is 396,000*l*. more; but the accommodation-paper has increased 2½ millions, to the utter ruin of all trade, the obstruction of all loans for private purposes, and the destruction of that trading enterprize, on which depends the subsistence of the people, and the power of paying the taxes. No man will lend at 4 or 5 per cent. on private security, when he can get government security in 100*l*. Exchequer Bills, at 3 and 3½ per cent.

On the 5th of July, 1832, it appears that the income, from the 5th of July, 1831, was 40,296,522*l*., and the expenditure 47,559,709*l*., being an excess of expenditure over income of 1,263,187*l*. And, on the same day, the balance in the Exchequer was 1,928,478*l*., and the accommodation paper was 29,494,050*l*., or above two millions less than in April; owing to only 150,660*l*. being applied to the reduction of the debt, and to the July balance being as above, under two millions, while the July balance, in 1831, was 4,614,252*l*.

The funded debt in the year cost 27,678,709*l*., and the interest of Exchequer bills was 664,071*l*.

It is asserted, that savings have been made in expenditure of 2,162,000, so that with equal revenue there will be a surplus of 770,000*l*. in July, 1833.

The total CHARGES on collection were 4,588,167*l*.

The funded debt .	£27,691,583
The exchequer bills .	649,833
The civil list . . .	870,836
Pensions . . .	437,568
Salaries, &c. . . .	86,335
Courts of law . .	270,925
Army	7,216,293
Navy	5,689,859
Ordnance . . .	1,472,944
Miscellaneous . .	3,090,000

In the Customs, United Kingdom, the cost was

Civil department . .	895,556
Harbour vessels . .	4,593
Cruizers . . .	104,002
Water guard . . .	296,172
Land guard . . .	17,503
In the EXCISE.	
Civil department . .	1,120,040
Cruizers . . .	5,949
In the stamps . .	185,110
Assessed taxes . .	281,304
Post-office . . .	658,320

EXPENDITURE.

Quarantine and warehousing establishments cost	£203,734
Bounties	170,999
Scotch clergy	16,521
Scotch civil government	140,249
Woods and forests	143,984
French claims	75,000
Strand improvements	73,187

Bounties on British linens exported, 111,780*l*., on Irish linens, 26,973*l*., on sailcloth 10,186*l*.

The BRITISH EXCHEQUER is governed by a chancellor, assisted by an auditor's office, a tally court, the office of pells, 4 tellers with clerks, and Exchequer-bill offices.

The Customs of London are conducted by 13 commissioners, and about 750 officers and clerks. There are also 80 out-port establishments (of from 4 to 12 persons) in England and Wales.

The Excise system was commenced by the Long Parliament, continued under Cromwell and Charles II., and organized, as at present, in the Walpole administration. Its collection is 5*l*. 6*s*. 4*d*. per cent., and it gives employment to about 7,000 officers, gaugers, &c.; and is managed by 12 commissioners and 4 assistants, with 5 commissioners of appeal, and 100 resident clerks, receivers, &c. There are, also, 50 examiners and 57 collectors in the country.

The Stamp-office, established in 1694, is conducted by 6 commissioners, a secretary, comptroller, with a legacy department under a comptroller; employing altogether about 150 clerks, &c.

The Revenues at the commencement of every century, since the Conquest, were as under:—

Henry I.	(1100)	£300,000
Henry III.	(1214)	80,000
Edward II.	(1307)	100,000
Henry IV.	(1399)	100,000
Henry VII.	(1500)	400,000
Elizabeth	(1600)	500,000
William III.	(1700)	3,895,205
George III.	(1800)	48,076,250
Loan	(1800)	18,500,000

Nett produce of the Public Revenue at the Accession of Sovereigns:—

On the accession of

James I.	(1603)	£600,000
Charles I.	(1625)	896,891
The Commonwealth	(1648)	1,517,247
Charles II.	(1660)	1,800,000
James II.	(1685)	2,000,000
William and Mary	(1688)	2,001,855
Anne	(1701)	3,895,905
George I.	(1714)	5,691,803
George II.	(1727)	6,762,643
George III.	(1760)	8,523,540
George IV.	(1820)	46,132,634
William IV.	(1830)	47,139,873

The assessed taxes are under a board, consisting of chairman, 3 commissioners, secretary, comptroller, and about 30 clerks.

From 1688 to 1830, or, in 142 years, the House of Commons voted away, of the people's property, 6 millions per annum for 60 years in taxes; for 30 years, 8 millions per annum; in the next 20 years, 20 millions; and in the last 32 years, 60 millions, making a total of 2,920 millions; and they, besides, incurred a debt of 850 millions, funded and unfunded, voting away, in all, 3,770 millions. In the 142 years before 1688, they voted about 2 millions per annum, or 284 millions; consequently, the Revolutionary Government has cost the nation 3,500 millions sterling, a sum equal to double the present money value of all the property in the nation.

The Nett Amount of Taxes has been as under, in this century—

1800	£34,069,457
1810	67,825,597
1815	71,155,142
1820	55,063,693
1825	52,919,280
1827	50,356,110
1828	52,418,055
1830	50,786,682

The present land-tax yielded, in 1828, 1,187,838*l*.; of which 188,655*l*. were for Middlesex; 44,549*l*. for Yorkshire; 52,293*l*. for Lincoln; 63,783*l*. for Norfolk; 50,222*l*. for Suffolk; 49,854*l*. for Devon; 11,628*l*. for Lancashire; 42,399*l*. for Essex; and 44,641*l*. for Somerset. The redemptions to Lady-day, 1830, were 712,889*l*.; and Middlesex had redeemed 82,223*l*.; Yorkshire 44,191*l*.; Lancashire 7,849*l*.; and Essex 46,288*l*.

The land-tax was laid, in 1693, at 4*s*. on the then rents, and produced two millions per annum.

In 1813, at 108*s*. per quarter, to pay the 74½ millions of taxes, it required 13¾ millions of quarters of wheat. But in 1821 it took, at 55*s*. 22 millions of quarters to pay 60½ millions of taxes; and, to pay the entire of public assessments, 69 millions, 25 millions quarters of wheat.

The consumers of wine and spirits of England, at five bottles to the imperial gallon, pay 6*d*. duty on cape wine; 10*d*. on Portuguese and Spanish white wines; 1*s*. 6*d*. on French wines; 1*s*. 8*d*. on rum; and 4*s*. 6*d*. on brandy and hollands, per bottle.

The number of stamps issued for newspapers were, in 1826, 25,684,003 for England and Wales; 1,296,549 for Scotland, and 3,473,014 for Ireland, yielding 390,685*l*. duty. In 1801, the whole number was 17½ millions, and in 1797, but 15 millions.

In 1825 the newspaper stamps were 16,910,066; and in 1829 were 17,996,279.

The stamps of 3½*d.* on newspapers yielded, in 1815, 363,500*l.*; io 1820, 365,080*l.*; in 1825, 40,728*l.*; and, in 1829, 438,667*l.* In Scotland, in 1825, 22,387*l.*; and, in 1829, 42,301*l.* This shows a total of papers in Great Britain, in 1829, allowing discount, of 36,280,000*l.*, or, on the average, nearly 100,000*l.* per day.

In Ireland, the duties were, in 1825, 26,659*l.*; and, in 1829, 28,578*l.*

The advertisement doties yielded, in 1829, in England, 136,053*l.*; in Scotland, 17,592*l.*; and, in Ireland, 14,985*l.*

25,589 dealers in tea and coffee pay 11*s.* license; and 121,995 dealers in snuff and tobacco, pay 5*s.* which includes publicaus. The licensing system yields aboot 850,000*l.* per annom.

The number of horses which paid duty in 1805, was 1,178,000; of which the pleasure-horses exceeded 200,000; the whole consuming the produce of 7,000,009 acres.

The dnty paid on dogs, in 1829, was on 365,085, besides 69 packs of hoonds.

The taxes of the United Kingdom are 59½ millions; besides 18 more for roads, poor, tythes, and local justice. In Aostria, 14 millions; in France, 39 millions; in Russia, 17½; in Prussia, 8; and, in Spain, 6½ are the taxes, including (in France) roads, poor, and clergy; and, in the others, roads and poor.

While the taxes in England are 50 millions, the income of the people, as qruadruple, ought to be 200 millions, arising from 2000 millions of transactions, which again are dependant on the quantities of carrency.

The taxes now levied exceed the rental of the land of the United Kingdom by the highest estimates ever made of it. They are at the rate of 1*l.* 1*s.* per acre in cultivation; at the rate of 2*l.* 9*s.* on every head of the popolation, or 13*l.* or 5*s.* per week on every family, directly or indirectly. Other assessments are 1*s.* 6*d.* more, and fall on all comsumption, aod actual consomers, per head.

Every inhabitant of Great Britain pays 2*l.* 16*s.* in revenue more than the French; 2*l.* 5*s.* more than the Netherlands; 5*l.* 4*s.* more than in the United States; and 10*l.* 5*s.* more than in Russia. The debt of England, 34*l.* 15*s.* to every inhabitant, is 7 times that of the Netherlands, 6 that of France, aod 40 that of Russia.

Taxes in Ireland to Jan. 5:—

1826	£4,750,266
1827	4,472,337
1828	4,489,509
1829	4,734,292
1830	4,462,831

(Exclusive of tea, about 480,000.)

The best writers on political economy conceive that taxation becomes injurious when it exceeds a foorth of the private incomes of a country, and oppressive when it exceeds a third.

The General and Twopenny Post-office is directed by a post-master-general, a secretary, surveyor, and chief-clerk; with a mail-coach division, a foreign letter division, and inland letter division, in which there are 200 clerks and sorters.

The two-penny is under a comptroller ond assistants, with about 60 clerks and sorters.

5*l.* 19*s.* 3½*d.* is allowed, per double mile, for conveying letters per mail-coaches. 10,219,872 letters are received per annum, in London, from the country, of which, 28,467 per day are delivered. Liverpool sends 400; Manchester and Birmingham, 350 each. The two-penny post delivers nearly 40,000 daily.

In 1829, *per Accounts of January* 5, 1830, *Duties of Excise were paid in England and Wales on quantities as under:*—

7,398,852 barrels of beer,
1110 millions of bricks,
75 millions of tiles,
100 millions lbs. of soap,
5½ millions lbs. of starch,
46¼ millions of hides,
23½ millions of bushels of malt,
110 millions of lbs. of candles,
17¾ millions of lbs. of coffee,
29½ millions lbs. of tea,
59⅛ millions lbs. of paper,
37,742 cwt. mill-boards,
110½ millions yards of printed calicoes, &c.
7¾ millions gallons of British spirits,
13 millions lbs. of tobacco.

Scotland apprnximated only, in spirits, 5¾; and Ireland exceeded 9½. In printed goods, Scotland was 26; and, in others, only a 50th or 100th.

In all, 759,000*l*, is re-expended in Ireland, of its revenoe in varioos pecoliar expences, besides 207,000*l.* for the civil list of the lord-lieutenant; and 262,000*l.* paid for public-works, &c. The debt also absorbs a further payment of 1,151,000*l.*, leaving a balance of nett revenue in favoor of Great Britain of little above a million; while the army and navy for Ireland cost about two millions.

The debt of Ireland was, at the close of 1829 31, 626,390*l.*; the charge of which, according to the finance accounts, was 1,189,389*l.* At the commencement of the year 1824, the debt was but 26,340,630*l.*, and the charge 1,008,125*l.*

Licenses granted for selling beer, wine, and spirits, in 1829:—For beer, 66,589, from 1 to 3 guineas, according

to rent; for wine-merchants 70*l*., of whom there are 1800; and 18,000 with beer and spirits, at 2 guineas.

Fire insurance stamps have risen from 496,383*l*. in 1815, to 776,007*l*. in 1829.

The Sun Fire-office pays 118,856*l*. duty; the Protector, 54,287*l*.; the Phœnix, 65,650.; the Royal Exchange, 49,786*l*.; and the County, 44,822*l*.; the Norwich Union, 61,186*l*.; and the West of England, 23,858*l*. There are 41 offices.

In 1831, 35 millions of bushels of barley paid duty in the United Kingdom, of which, 30½ for England and Wales.

Middlesex, in 1829, paid 1,340,643*l*. to the land and assessed taxes; and Somerset, 202,860*l*.; Surrey, 272,538*l*.; and Yorkshire, 264,379*l*.

The house-duty of England and Wales, in 1829, was 1,241,791*l*.; of which London paid 770,166*l*. The rentals were 11,154,109. The houses assessed above 10*l*. were 378,786, and those for windows 8, and upwards, 344,495.

Cards have increased in sale since the duty was lowered from 2*s*. 6*d*. to 1*s*. from 146,000 packs to 320,000 packs.

The duty on foreign eggs is 1*d*. per dozen; and, in 3 months, it lately yielded 2000*l*. for Ramsgate only, *i. e.* 480,000 dozen.

3043 auction licenses were granted in 1830, and only 2467 in 1831.

From Lady-day, 1826, to 1827, the highway-rates (over and above tolls) were, in England and Wales, 1,121,834*l*.; the church-rates (over and above tithes, Easter dues, fees, &c.) were 564,388*l*.; and the poor-rates and county rates, 7,803,465*l*.; in all, 9,489,687*l*. on an income from real property, which, in 1815, was 51,898,423*l*., but reduced by the panic to at most 40 millions; and, since 1827, probably to 35 millions in 1831, without any abatement, but rather an increase of the local taxes, including tolls, Easter dues, &c.; therefore, these local taxes are a full third of the income on real property, without considering tithes, &c.

In 1825 the number of testators were 14,866, and of intestates 5043, whose property, passing under probate and administration, was 46,435,066*l*. Of which 35,806,400 paid legacy duty, 1,048,692, or 4*l*. 1*s*. 8*d*. per cent. The probate duty was 831,190*l*. In 33 years this shews an acknowledged tranfer by death of 1500 millions, but the data are illusory.

In 1821, 1822, the average consumption of gin was 11,974,000 gallons, but the duty was reduced, and, in 1825-6 and 7, was 24,360,460 gallons.

There were, in 1829, 46,153 acres in hops, and the duty, 69,333*l*.

The public expenditure, in 1767, was 8½ millions; in 1769, 7 millions; from 1770 to 1776, was from 7 to 8 millions; from 1783 to 1793, 16 millions; in 1802, it was 65 millions; in 1803-4, 35 millions; in 1815, 120 millions; and since 1817, from 70 to 52 millions.

The supplies voted for the army, in 1767, were 17,353*l*., and for the navy, 16,000*l*.

In 1827, the Treasury employed 118 persons, with salaries of 67,438*l*.

The Navy-office, 140; salaries 50,790*l*.
The Ordnance, 528; salaries 116,688*l*.
The Customs, 11,346; salaries, 964,751*l*.
The Excise, 6491; salaries 768,795*l*.
Stamps, 519; salaries 134,065*l*.
Tax-office, 347; salaries 74,190*l*.
Post-office (Great Britain), 1377; salaries 85,970*l*. Post-office (Ireland) 323; salaries, 21,962*l*.
War-office, 107; salaries 33,645*l*.

The produce of the tax on income, in 1801, at 5 per cent., was 5,716,572*l*. The total number of assessments was 329,750; of which, 54,321 were from 60 to 65*l*. per annum; and the total aggregate of income was 80,002,394*l*.

The Returns of Income, on round millions, under the Income-tax, in 1814, *was as under:—*

Lands, &c.	60
Houses, &c.	38½
Profits of Trade	38½
Salaries, &c.	12
Funds	30
Millions	179

In 1804, a tax of 1*s*. on all incomes exceeding 60*l*., yielded 4,650,000*l*. In 1808, at 2*s*., or 10 per cent. on incomes above 50*l*., including the funds, it amounted to 16,548,985*l*., making all income about 200 millions, on which a third was assessed in various taxes. The income, since 1825, has not been rated higher than 85 millions, on which 50 in taxes and 20 in assessments are levied. Land, in 1808, at 10 per cent. yielded 5,923,486*l*.; but, it is stated that it would not, in 1830, yield above four millions. 120,000 traders returned their income, in 1814, under 150*l*.; 40,000, above 150*l*.; and 3800, above 1000*l*.; in all, 3½ millions.

The assessments on real property, under the property-tax of 1815, were 51,898,423*l*. Of which, Middlesex was 5,595,537*l*.; Lancashire, 3,087,774*l*; and Yorkshire, 4,700,000*l*.; while Wales, of 4,752,000 acres, or 1 million more than Yorkshire, was but 2,153,801*l*.

It appears by the Property tax, in 1815, *that the most wealthy counties returned as under:—*

Middlesex	£5,599,537
Lancashire	3,087,774
West Riding (Yorkshire)	2,392,406
Lincolnshire	2,061,930
Somersetshire	1,900,651

Devonshire	£1,897,515
Kent	1,644,179
Surrey	1,579,173
Essex	1,556,836
Norfolk	1,540,952
Wales	2,153 801

The taxes of Great Britain, in 1815, were 71,203,142*l*., and of Ireland, 7,334,786*l*., being the highest sums ever collected; but, they have fallen gradually, and, in 1831, were 46,444,514*l*. for Great Britain, and 4,393,036*l*. for Ireland.

Scotland yielded to the property-tax, in 1813, only 966,790*l*., being less than 1-14th of the whole kingdom.

The nett assessments under the income tax of 5 per cent. in 1809, was 5,529,382 for England and Wales, but for Scotland, it was only one eighteenth, or 324,247*l*. Under the property-tax of 10 per cent. in 1812, it was 9,671,634*l*. for England and Wales, and a tenth for Scotland, or 963,366*l*.

The public debt of France, in 1788, was 4½ thousand millions of francs. In 1807, it was not two thousand millions. In 1829, 4⅓ thousand milllons, and, in June 1832, it had risen to 5⅓ thousand millions, or about 220 millions sterling.

The revenue of France, in the first six months of 1832, was 267,930,000 francs, about 11 millions sterling, of which 93 millions was derived from mortgage, duties, stamps, &c., 50¾ millions from customs, 61 millions from salt, tobacco, and gunpowder; 40 millions from indirect taxes, and 17 millions from the post-office. The miserable shift of lotteries produced 5½ millions.

Expences of the French Government in 1830 :—

Branches.	No. employed.	Salaries.
Justice	10,747	16,166,900
Foreign Affairs	261	5,370,900
Church	47,338	31,096,800
Army (peace establishment)	194,475	88,650,200
Navy	42,250	22,369,100
Finances	65,962	82,023,400
Trade	15	52,000
Home Department	2,327	8,283,000
Heads of Administration	766	5,609,400
Sundries	4,901	12,222,900
Pensioners	245,216	74,328,400
Colonies	933	3,338,700
Royal Printing-house		640,000
14 milllons sterling	615,192	350,192,000

5 Cardinals receive	150,000
14 Archbishops	425,000
66 Bishops	990,000
3,300 Curates	3,973,800
26,624 Assistant Curates	17,606,000
4,790 Vicars	1,335,000
11,025 Seminarists	2,400,000
527 Protestant Pastors	616,000
Religion (1,100,000 sterling)	27,495,000
9 Ministers of State	1,180,000
8 General Directors	300,000
86 Prefects	8,000,000
278 Sub-prefects	231,000

The following is the Financial Report of the United States in 1830 :

The revenue had exceeded the estimate by 300,000 dollars.

Total revenue	£5,033,044
Interest and repayment of debt	2,422,858
Expenses of government	2,862,980
Balance in the Treasury Jan.1.	1,004,120

An American citizen, in 1835, will pay in all 4*s*. 4*d*. per annum to the federal government, and 10*d*. for the local state government.

The total revenue, in 1829, was 25 millions of dollars, which included 12½ for public debt, now extinguished; 8 for navy and army; and 589,159 for grants to Indian nations.

The revenues of Spain are about 6½ millions sterling, or 550 millions of copper reals, at 2½d.

TAXES are always paid by labour, because capitalists, proprietors, and middle men, can shift taxes on them, and they, as the last term, cannot shift them. One shilling per week abstracted from five millions of labourers, is 13 millions per annum, and as at least seven per week have been abstracted for many years, so 91 millions have been assessed on labour per annum, for taxes and profits to other classes.

All taxation increases the number of unproductive consumers, and the amount, of unproductive consumption, and tends not to enrich, but to impoverish a nation.

The strength of a government consists in its power of expenditure, or in its revenues; that is, on its power of hiring soldiers and sailors, and purchasing the *materiel* of war. Then these revenues can only be a certain proportion of the private revenues of its subjects, as a fourth or fifth. These, again, depend on nature; that is, on the annual profits of the soil, and of machine power, and of various manufacturing manipulations. These profits, therefore, are the legitimate sources of Fiscal exactions. But, as other profits accrue, or may accrue, in the distribution of the natural products, so financiers oppress subjects, in trying to follow these variable profits, by tests of transactions and personal consumption; and, hence the varied annoyances of taxation. Steady prices are also indispensable to private incomes, and these entirely depend on uniform amounts of currency.

MONETARY AND BANKING.

Banks, now so useful, were of Venetian invention; and the first was contrived about 1150, to assist in the transactions of a loan, and called "*The Chamber of Loans.*" It soon became the celebrated Bank of Venice, and conducted all money transactions. The plan was carried into foreign countries; and the projectors being called Lombards, the great banking-street in London is, to this day, called Lombard-street. Its celebrity led to the establishment of similar public banks at Barcelona, in 1401; at Genoa, 1407; at Amsterdam, in 1609; in London, 1694; at Edinburgh, 1695; and at Paris, in 1716. In the British Islands, there are at present above 900; and, previous to the panic of 1825, about 1100. The Bank of England is banker to the government, receiving all taxes, and paying all dividends and outgoings for the public offices, for which it receives 260,000*l.* annually. Its charter expires August 1, 1835. It is managed by a governor, deputy-governor, and 24 directors; and there are also public quarterly courts of proprietors, of 500*l.* stock, which yields from 7 to 10 per cent.; and every 100*l.* has, for many years, fetched from 190*l.* to 220*l.* Its issues of its own notes, as public currency, have been as high as 33 millions, but have averaged about 24 millions; and the panic, which ruined the commercial interest of England, was occasioned by the sudden reduction to 17 millions.

The Bank of France led to portentous consequences; for its legitimate purposes, there were 1200 shares, of 250*l.* each; but, in two years, the government took it into its own hands, and established *branches* through France. Louisiana was assigned to it, and 200,000 shares, of 25*l.* each, were added. Afterwards the farm of tobacco, and then the exclusive trade to India, on which 50,000 new shares were created; and, finally, it consisted of 600,000 shares. Speculation now raised the shares to 50 and 100 times their original value. Those who held them made great fortunes, sometimes in a few weeks; but alarm created suspicion, and the shares as suddenly fell below their first value, by which thousands of families were brought to beggary. This was called "*Law's Mississippi Scheme.*" This circumstance begat, in England, a company for trading to the South Seas; and a similar mania to that in France seized on the English nation. There were 20,000 shares of 100*l.* each; and they rose, in a few weeks, to 50 and 100 times their value; but the secretary eloping with a very large proportion of the capital, and it being discovered that fraudulent shares were issued by the directors, they fell in price as rapidly as they rose, and thousands were left in destitution. This was called the "*South-Sea Bubble;* and its temporary success gave rise to so many schemes and companies, that the year 1722 is generally called the bubble year. A nearly similar mania took place in 1792, in regard to canal shares; and something of the same kind in 1825, when companies were formed for the most extravagant and most absurd projects; the shares in which, in their rise and fall, involved hundreds of families in ruin.

In 1718, the Bank of England notes in circulation were 1,829,930*l.* In 1754, the first bank post-bills were issued. In 1778, the bank-notes were 7,030,680*l.*; and, in 1791, they rather exceeded 10 millions. In 1797, at the time of stoppage, the amount was 8,742,530*l.*; and the bank post-bills, 461,070*l.* In the same year, small notes were first issued to the amount of nearly a million. In 1815, the notes above 5*l.* were 16,522,530*l.*; and, under 5*l.*, 9,065,890*l.*; besides bank post-bills, 1,215,100*l.*: in all, near 27 millions. The allowance to the Bank, for keeping the public balances and paying dividends, is 340*l.* per million; and 300*l.* per million on any excess of debt above 600,000,000*l* This, in 1815, amounted to 281,568*l.* Payments at the Bank of Ireland were suspended in 1797, at the same time as the Bank of England. Its notes, at that time, were 621,917*l.*; but, in 1810, they were 3,192,186*l.*

The Bank of England is managed by a governor, deputy, and 24 directors, with about 1000 clerks. The Bank of Ireland has 14 directors; that of Scotland 11; and the Royal Bank 9.

There is a very useful public board for the loan of exchequer-bills, for public works, and fisheries, conducted by 28 commissioners, &c.

The interest of money is necessarily fixed in a commercial country, owing to the variety of securities, for, if not fixed, men might borrow on real property at a low rate, and commercial securities would be at a rate destructive of all trade and credit.

In the reign of Henry VIII. interest was fixed at 10 per cent.; in that of James I. at 8 per cent.; by Cromwell, at 6 per cent.; and, in 1712, at 5 per cent. Trade rises as interest lowers, because its security is not equal to land, and high interest destroys trade.

Par is the equal value of the specie of one country in that of another country. The course of exchange is usually above or below the equality.

The national debt was established at the revolution, and certain taxes pawned to pay the interest, for the two-fold purpose of supplying King William with money for his wars, and of attaching the creditors to the new government.

At the end of the war, 1697, it was	£21,515,772
At the peace of Utrecht	55,282,973
At the peace of Aix-la-Chapelle	79,193,313
At the peace of Paris	133,959,270
At the close of the American war	238,231,248
At the close of the first French war	499,753,067
At the close of the war with Napoleon	699,315,561
Irish debt (1816)	83,944,904

Interest and expences of the debt, at sundry times, has been as under:—

In 1760	4,700,000
1780	7,500,000
1791	9,250,000
1830	31,252,612

On the 26th February, 1797, the Pitt administration, as an affair of state policy, and to extend indefinitely the circulation, for the wild objects of the war, availed itself of an alarm, created by the landing of 1000 French troops in Wales, to issue an order in council, directing the Bank of England no longer to pay cash for its notes. This gave a power of indefinite and irresponsible creation, and enabled the ministry to raise loans and carry on the government at a waste of money which has ultimately exhausted the country, and utterly ruined this generation.—*The Bank-Notes and Bank Post-bills in circulation were as under:—*

1792	£11,149,809
1802	16,887,113
1812	23,482,910
1817	30,099,908
1825	19,548,800
Panic in consequence.	
1830	20,468,060

The highest amount of 1*l.* and 2*l.* notes was, in 1814, 9,667,217*l.*; and, in Feb. 1830, but 320,550*l.*

In February, 1826, the coin in the Bank of England was but 1,043,000, and bullion 1,415,000*l.*, its liabilities being 29,834,000*l.* and its estimated assets 33,730,000*l.*

In 1831, the coin was but 4,535,000*l.* and bullion only 757,000*l.* against liabilities for 30,814,000*l.* But, in 1830, the coin was 7,095,000*l.* and bullion 6,151,000*l.* against 29,424,000.

The excess of the assets of the Bank has been about two and a half millions, on the average, in the last seven years; but, in 1815 and 1816, the excess averaged eight millions.

As the half-pay, in 1823, exceeded five millions per annum, government agreed to pay the Bank 585,740*l.* per annum for 44 years, on the Bank paying, in five years, the sum of 13,089,000*l.* to the half-pay.

From 1730 to 1781, the Bank dividends were rather more than 5 per cent.; but, in 1807 and in 1816, it was 10, and, in 1823, 8 per cent. In 1759, notes of 10*l.* were first issued; in 1793, those of 5*l.*; and, in 1797, those of 1*l.* and 2*l.*

In 1826, it was stated, in evidence, that the deposits in the great Scotch banking companies were nearly 24 millions. The private banks, in Edinburgh, are very poor and illiberal concerns.

The Bank of England pays a composition, in lieu of stamps, of 3500*l.* per million on their circulation.

The Bank of England has 11 branch banks, with no success; and, in 5 years only, 15 joint-stock company banks have been established, and with little success; for banks are not made—they grow like trees with deep roots in public opinion, in 30, 40, or 50 years.

There are, in 1832, 934 banks out of London in the United Kingdom, including about 200 branches of the Bank of England, Scotland, or local banks.

There are 31 joint-stock-company banks in Scotland, and only three of private persons, which are inferior in every respect to the former, little used or less respected. The Bank of Scotland, 1695, has 16 branches; the British Linen Company 27; the Royal Bank 1; all in Edinburgh, and chartered.

Seventeen million of stamps, for notes, were issued to country bankers in 1824-5, and 6; and 14½ in 1821-2, and 3. In 1825, the amount was 8¾ millions, and 1826, but 1½.

In 1818, the 2*s.* stamps from 20 to 30*l.* for bills and notes, were 452,768; but, in 1830, only 322,495. In 1818, the 3*s.* 6*d.* from 50 to 100*l.*, were 479,231; and, in 1830, but 350,660. And, in 1818, the stamps for 500*l.* and upwards, were 158,517, and, in 1830, only 107,313; indicating a reduction, in twelve years, of trade, credit, and transactions of a full third.

Seventy-three country banks, and seven London banks, stopped in the panic of December, 1825. All the other banks were so run upon, that even, in 1832, half of them have not recovered the shock, or realized the losses which they suffered. At the same time, about 500 mercantile and manufacturing establishments, of the first class, were ruined; from 2000 to 3000 of the second class; and many thousands of shopkeepers, farmers, &c.; perhaps, one-half in Great Britain.

The public wealth or credit of the commercial establishments of England,

(for wealth and credit are synonimes) had been fostered by the contrivance of Banks of Deposit. They assembled, as in a reservoir or fulcrum, all the wealth of their neighbourhood, and had the strength of a bundle of sticks, however weak, when separated. Thus the strength of all was united for direction towards any desirable purpose; and, hence the improvements, vast revenues, unlimited capital, and prosperity of the country.

The transactions of 50 out of 70 London bankers, are from 4 to 5 millions per day, and they are balanced at the clearing-house for a sum, in cash, of 220,000*l*. On settling-days at the Stock Exchange, &c. the amount is often 15 or 20 millions.—*Burgess*.

Paper currency tends to raise the price of bullion in a country, but as it equally raises the invoice price of exports, no difference ultimately arises to the merchant or manufacturer.

The years in which the industrious traders of England were sacrificed to the financial operations of the government were, in 1793, bankrupts 1956, (1792, 734); 1810, 2314; (1809, 1382,) 1811, 2500; 1816, 2731; 1826, 2582, (1825, 1103). In every bankruptcy, about ten other families are ruined!

In 1793, 100 country banks failed; in 1810, 26; in 1817, 37; and in December 1825, 76. These mischiefs were owing to the government not allowing country bankers to give security for their issues.

In 1826, after the panic, there were 2583 bankruptcies, 253 declarations of insolvency, and 4580 insolvent debtors. The number of private compositions within nine months, it is supposed, exceeded 20,000.

It is an indispensible feature of a sound banking system, that security should be deposited with the government, for all their issues of paper-money; and an essential regulation, that all issuers of promissory notes, and drawers of bills, should, under criminal penalty, express the special consideration for which they are drawn.

Exchequer-bills are, in effect, accommodation-notes of government, issued in anticipation of taxes at daily interest; and, being received for taxes, and paid by the Bank in lieu of taxes, in its dealings with the Exchequer they usually bear a premium. At 2*d*. per day, they yield 2*l*. 10*s*. 10*d*. interest; and at 2½*d*., 3*l*. 3*s*. 6½*d*.; and, being equivalent to money, produce, in general, a premium, at least, equal to their interest. From 29 to 32 millions are now in circulation!!

The present funding system, so specious a means of government extravagance, and so destructive of trade and industry, is ascribed to Bishop Burnet; but all our kings were in the practice of pawning their revenues for temporary purposes.

The total of the present debt, on 5th January, 1832, was 840,814,022*l*.; and its total annual charge, 28,349,754*l*., or 2*s*. per week per labouring man, nearly.

The Bank of England discounts bills, under 95 days, for persons who have interest to obtain discount accounts, and who must be wholesale dealers, or persons who never break bulk.

When Mr. Pitt proposed the income-tax, he estimated the income of the country at 102 millions in 1798; but, in 1810, it was estimated at 125 millions. The property-tax, at 10 per cent., yielded, in 1815, 14,978,557*l*.; and, as it has been supposed that half was not assessed, the whole income in the money value of 1815 was estimated at 225 millions; but since the failure of the manufacturing system, by free trade without reciprocity, and the reduction of values by experiments on the currency, the income, in 1827-8, has not been considered greater than it was estimated by Mr. Pitt in 1798. While, as Mr. Pitt took the profits of trade at 40 millions, it is alledged that that amount ought to be deducted, which would reduce the income of the community to less than is assessed for public purposes.

When paper money and great government expenditure raised the value of property, three valuations were made, between 1800 and 1814, of the total value of all property. Two of them made it one thousand and a quarter millions, and another made it two thousand and a quarter millions; but, since then, the nominal values have fallen from 30 to 80 per cent. England was taken, by the last valuation, at 6; Scotland, 1; and Ireland, 2.

The Bullion Committee, of 1810, stated, that, at the price of gold, a guinea was then worth 23*s*.; and that this caused the foreign exchanges to be from 15 to 20 per cent. against England. They estimated country bank-notes at above 20 millions; and the Bank of England notes were then 21 millions; the gold, as coined, was 3*l*. 17*s*. 10½*d*. per oz., at the Mint price; but melted, the market-price per oz. was 4*l*. 12*s*. They contended, that this difference arose from the increase of paper circulation; but the bank directors maintained the contrary.

Till the 15th century, no Christians were allowed to receive interest of money, and Jews were the only usurers, and, therefore, often banished and persecuted. In 1329, they were banished to the number of 15,060.

Usury is the taking a farthing more than 5 per cent., directly or indirectly, and a fixed rate is the basis of trade, credit, and social prosperity; because, if open, none could borrow, except on real securities, at moderate rates; and uncertain commercial securities would have to pay ruinous interest, which would destroy borrowers and other creditors. In France, trade is crippled and credit destroyed by the power of taking 20 or 30 per cent. on bills of exchange. Among other mischievous projects of the political economists, they have sought to abolish the usury laws, the last sheet-anchor of our trading system.

Profit on capital employed in agriculture, manufactures, and commerce, taken on an average in any country, ought to be equal to three times the lowest rate of interest in the market. But, since 1825, it has yielded in England little more than interest!

Few lend, owing to risk, while none borrow, from inability to use with profit, or give security.

The Jews were forbidden to take interest from each other; but they were allowed to take it from strangers.

Interest for the loan of money in Greece was 12 per cent. At Rome, under Augustus, it was 10 per cent. but from a sudden influx of wealth fell to 4. Under Justinian it was 12 per cent. In England, under Edward VI., it was forbidden entirely, from religious motives. By 37th Hen. VIII., ch. 9, it was fixed at 10 per cent. per annum. This act was revived by 13th Eliz. ch. 8, and 10 per cent. continued the legal interest till 21st James 1st, when it was restricted to 8 per cent. Soon after the restoration of Charles II., it was reduced to 6 per cent. By 12th Ann, stat. 2, ch. 16, it was fixed at 5 per cent. per annum; and so it continues for all loans made in England. If made in a foreign country, the rate of interest at the time in that country regulates the contract. In the United States, each state has fixed its own legal rate of interest, according to the exigencies and circumstances of the time when the law was made.

In the United States, as well as in England, it is unlawful to take more than the INTEREST allowed by law, and money is limited in interest owing to *the variable character of securities*, for the protection of the needy borrower, no profits of trade could accrue, nor any credit exist, if the interest of money were unrestrained on *commercial securities*. The power of a borrower to give any required interest, on such securities, would render it unsafe to give credit to any person in trade, and the repeal of these laws would therefore be the finishing stroke to the commerce of England.

Rises or falls in the funds are governed entirely by supply, or demand at the moment; or by speculations on the probability of supply, or demand. A rise may attend a low state of trade, from capital not being otherwise required, or a fall from improved trade. Prices are also affected by the relative strength of the two parties of ***Bulls*** and *Bears*, without any reference whatever to public events. It is with the stocks as with other commodities.

The 3 per cents were, on Dec. 10, 1752, at $106\frac{3}{8}$, and on Sept. 20, 1797, at $47\frac{7}{8}$.

After the panic, in February 1826, consols fell from 83 to $74\frac{5}{8}$, and exchequer bills from 10 premium to 22 discount.

The stock-brokers and jobbers about the Stock Exchange are themselves proprietors of 15 or 16 millions, and it is their speculations which influences the prices. They are also engaged in time bargains, often for 40 or 50 millions, on which they may pay differences or deliver stock. Real buyers, or real sellers, are met by these jobbers, so that no effect on prices arises from real transactions, and the whole is a contest between the *bulls*, who speculate on a rise, and the *bears* on a fall.

In March, 1830, the numbers of stockholders were 288,481, of whom 92,223 received dividends under 5*l.*; other 42,003, under 10*l.*; 101,274, under 50*l.*; and 26,140 under 100*l.*; making 261,640 persons. Of the remainder, 15,604 receive from 100*l.* to 200*l.*; 5178, from 200*l.* to 300*l.*; 3260 up to 500*l.*; 1741, from 500*l.* to 1000*l.*; 490, from 1000 to 2000*l.*; and, above 2000*l.*, but 218. 94,000 each are in the 3 and new 4 per cents.; and 35,000 each in the 3 reduced and 4 per cents. Foreigners hold but a 64th of the whole.

In 1832, the capital of the Equitable Assurance Company exceeded sixteen millions.

From 1690 to 1821 inclusive, the bullion furnished by the Mexican mines amounted, in round numbers, to about four hundred millions of pounds sterling, of which the gold was somewhat more than one twentieth.

The bullion committee of the house of commons, in 1810, computed the whole annual supply of bullion at that time, at eight millions sterling for European use, one third of which is used for manufactures.

In England the mint price of gold is 3*l.* 17*s.* $10\frac{1}{2}$*d.* per ounce troy; and of silver, 62 pence; so that a guinea

should weigh 129 39-89 grains, and contain 118 58-89 grains of pure gold; and the shilling should weigh 92 28 31 grains and contain 85 29-31 of pure silver. Hence, the mint proportion of value between gold and silver, is as 15 13-62 to 1 nearly. But the bullion value in the market is usually about 14½ to 1. A guinea fresh coined weighs in fact 129.44 grains of twenty-two carats fine; fine gold being twenty-four carats. So that the alloy is two carats in twenty-four, or one twelfth.

In the United States, one pound troy of standard silver contains eleven ounces two dwts. of pure silver.

A French crown is found to be worth one hundred and nine cents and one mill. A five-franc piece, ninety-three cents two mills; a Spanish dollar, one hundred cents and four mills.

A pound sterling, if paid in gold, is worth four dollars fifty-six cents, and .572 of a cent. If paid in silver, four dollars thirty-four cents, and .894 of a cent; so that silver is at present higher than gold.

In the United States, they alloy pure gold with 1 12th of copper. The alloy of copper in silver is 44 3-4 grains in a dollar of four hundred and sixteen grains.

At the par of exchange, 1*l.* sterling is equal to 25.2 francs; or, an English bill for 100*l.* at par, is equal to 2520 francs in Paris. If 100*l.* in London will buy a bill on Paris for more than 2520 francs, the exchange is in favour of London; or, if 100*l.* on London will not buy a Paris bill for so much as 2520 francs, then the exchange is in favour of Paris. The par of exchange with London and Amsterdam, is 36.8 schillings and pence for a pound sterling; with Hamburgh, 34.3½ schillings and pences; and, with Venice, 46.3; Lira Piccola, and the old Lira Piccola is 5.07 pence, and the modern 4.25 pence.

Foreign bills, drawn in England, are subject to stamps from 1*s.* 6*d.* to 15*s.*, according to amount.

In the United Kingdom, three days grace are allowed on all bills drawn after date or sight. In Holland, six days. Hamburgh, twelve days. France, ten days. Spain and Gibraltar, fourteen days. Portugal, six. Genoa, thirty.

The annual average of stock, bought by the Commissioners of the Sinking fund, has been as under:

	£	s.	d.
1787	75	10	6
1790	76	15	11
1792	84	8	10
1793	69	12	8
1794	74	19	9
1797	60	2	5
1798	50	1	0
1803	70	1	2
1805	56	16	6
1810	68	8	1
1815	66	11	4
1820	71	19	3
1824	80	5	10

In 23 years, from 1794 to 1816, the average was 70*l.* 1*s.* 2*d.* The greatest fluctuations in the same year were March 1793, 97*l.* and Dec. 72*l.* and March 1817, 68*l.* and Nov. 83*l.*

The dividends on Bank stock, &c. from 1720, were 8 and 9 per cent. From 1730 to 1807, it varied from 4½ to 7 per cent. From 1807 to 1823, was 10, and since, 8 per cent.

Dividends on stock are receivable Jan. 5, April 5, July 5, and Oct. 10. The cost of transfer under 25*l.* is 9*s.* and above, 12*s.*

500*l.* Bank stock for six months confers a vote as proprietor. In India stock 1000*l.* for a year; 3000*l.*, to 2 votes, 6000*l.* to 3, and 10,000*l.* to 4.

In the interval, between 1800 and 1821, the market price of gold exceeded the mint price of 3*l.* 17*s.* 10½*d.* per ounce, rising in 1814 to 5*l.* 4*s.* 0*d.* being a depreciation of Bank paper of 25½ per cent.

Before the Revolution of 1688, the public revenue was under two millions, bills and promissory notes were scarcely invented, or little used, and there was no paper currency. The necessity of borrowing, led to the establishment of a banking company, and to an issue of paper, this to rival banks as banks of deposit, and finally to others through the country, as banks of deposit, and issuers of paper money, to the number of 700 or 800. All these, at once, afforded the vast loans to government, and the country banks used their credit and real and artificial capital, in sustaining manufacturing establishments, trade in general, mines, canals, agriculture, and all kinds of local improvements; while the London banks, aided builders, merchants, &c. The wealth of the whole nation was thus in activity, and credit and industry were practical wealth. Buildings of all kinds were multiplied on mortgages, estates were improved by mortgages, roads were made and improved by mortgaging the tolls, and men in trade, and in all concerns, improved them by mortgaging part of their profits. The system produced a nation in a state of improvement, and mutual profit, which was without example.

It is a fatal error to infer, that effect of currency on industry is as the steadiness. It is not as the amount, but as the mode of issue combined with amount. Thus, a million issued by a country banker to the factories in his

district, is fifty times the benefit of a million issued by the Bank of England to wholesale dealers in London. The former system fosters industry immediately, and the latter serves only to raise the price of commodities, while little of it would reacn seats of industry, and promnte employment. It is the absence of ten millions of local issues, issued on the spot, that has stagnated the trade of the country, and the same prosperity could not have been effected, if the general issues of the Bank of England had been raised from 20 to 100 millions. Of this fact, the British Ministers and Parliaments, from not being men of business, have been ignorant, and owing to their ignorance, the welfare of the nation has been compromised.

Thongh Credit is private wealth, and the accumulation of it public wealth and streugth, yet the knowledge that it is so, does not beget power to create it. It is the product of circumstances in long time, and also of habits of life, and facilities of currency and transfer. It grows like an oak tree, which, if destroyed nr torn up, cannot be replaced by the will or caprice of man. At the panic of 1825, it had been growing in England for a century, and was then worth *several thousand millions.* It was the 100th power of 100,000 men.

In consequence of this system of credit, at the time of the panic, the following were an average of the mutual obligations of the people, one to another, or ultimately of four-fifths to a fifth. If to the 2744 millions were added the issues of the Bank of England and other bankers, this wonld be other thirty millions; and, if tn this were added the prime cost of dead enterprises, for which parties are receiving dividends or interest, the whole would amount to, at least, 3000 millions, besides the 800 millions of public debt. Yet on a people in such a social situation, and under public assessments for 65 or 70 millions per annum, it was judged proper to *experiment*, by raising the currency to double its value, and leaving the laws against debtors in full and even aggravated force!

	millions.
500 Corporations had borrowed, chiefly for local improvements, about 30,000*l.* each, making .	15
300 Towns ditto, 20,000 each .	6
300 Ditto, 10,000 . . .	3
14,000 Parishes for improvements, new workhouses, &c. &c. 3000*l.* .	42
25,000 Miles of Roads, 100*l.* each .	2½
2,500 Miles of Canals, 400*l.* each .	1
400 Mines, 5000*l.* each . .	1
50 Docks and Harbours, 20,000*l.* each	1
500 Bridges, 2000*l.* each . .	1
50 Rail-ways, 20,000*l.* each .	1
500 Hospitals and charities, 1000*l.* each . . .	½
Half a million of houses had been built and mortgaged at 300*l.* .	150
One million of other houses, at 200*l.*	200
Half a million of others, at 500*l.* each	250
One million unmortgaged	
24 Millions of acres had been mortgaged at 20*l.* per acre .	480
12 Millions at 10*l.* ditto .	120
12 Millions unmortgaged	
50,000 Traders, Manufacturers, &c. were in debt, 5000*l.* each on Stocks in hand, &c. . .	250
50,000 Ditto, 2000*l.* . .	100
50,000 Ditto, 500*l.* . .	25
50,000 Ditto, 300*l.* . . .	15
One million of individuals and families, 500*l.* each . .	500
One ditto, 300*l.* each . .	300
One and a-half millions not estimated	
10,000 Ships owed 2000*l.* each .	20
West India Property . .	50
Sundry unclassed Property .	50
Total millions	2744

In the horrible confusion since 1825 6, the people have been divided into fixed annultants and creditors, who profit by the high value and scarcity of currency; into those who hate bank-notes, as such, because the war-means of former governments; into those who, in the confusion, hope to see certain political theories realized; into those who desire gold as a mere abstract question; and a more numerous party, those who ascribe their own sufferings to the last and most obvious personal cause, and are as ignorant as the legislature itself of the real causes.

The situation of the creditors was that of the man who cut open the goose, that laid golden eggs. The 3000 millions were not to be found. It was scattered in property useless without *credit*. The gnvernment had permitted *credit* to be destroyed, as "useless and illusory." Neither pettyfoggers, nor sheriffs officers, could find effects. Seven-tenths of the people, therefore, became insolvents, or paupers. No benefit resulted to the tenth, the ultimate creditors, while the other two-tenths, making up a community, resembled as usual the drones in a beehive. Such has been the condition of Britain, from December 1825 to December 1832.

The rental of Scotland, about the period of the Union, was but 317,018*l.*; but, in 1812, it was 6,108,050*l.*, money being five times *less valuable*, but improvements had increased it fourfold. The population was under one million;

but, in 1821, it was two millions. Ships increased, too, from 215 to 3160; and the revenue was, in 1822, forty times greater than in 1707; *i. e.* 110,604*l* and 4,202,567*l*.

The investments in 384 Saving-Banks at Christmas, 1831, was thirteen millions, which included those of 5904 societies, who, with individuals, made 367,812 persons, averaging 34*l*. each.

The sums bought in by the Saving Banks, in 14 years, have been 20¾ millions; the sums withdrawn, 5¾.

At the Annual Meeting, at the Savings Bank, Devonport, the 31st of January, 1831, the following classification of 5,320 Accounts was exhibited:—

Small farmers	78
Agricultural labourers	275
Labourers of other descriptions	395
Small shopkeepers	248
Journeymen mechanics, artificers, &c.	1137
Domestic servants	915
Seafaring persons, royal marines, &c.	516
Soldiers	28
Apprentices	102
Teachers, shopmen, and women	101
Children	606
Females engaged in trade	305
Persons of small incomes	349
Miscellaneous	160
	5,215
Friendly Societies	85
Charitable Institutions	20
	5,320

Total of each Class:—

Accounts whose balances did not exceed 20*l*. each	2203
Above 20*l*. not exceeding 50*l*.	1381
Above 50*l*. not exceeding 100*l*.	819
Above 100*l*. not exceeding 150*l*.	339
Above 150*l*. not exceeding 200*l*.	172
Exceeding 200*l*.	100

It appears, by the registers of benefit societies, that persons, from 20 to 35 average 7 days sickness per annum; from 35 to 50, 9 days; from 50 to 55, 10 days; to 60, 13½ days; to 65, 21 days; to 70, 39½; and, above 70, 116 days.

A society may give 1*s*. per day after 65, 10*s*. per week in sickness, and 15*l*. at death, if its members, commencing at 15, pay 2*s*. 2½*d*. per week; at 25, 3*s*.; at 33, 4*s*. 4*d*.; and, at 45, 8*s*. 5½*d*.; making 4 per cent. of their money.

The public debt of Russia is 35½ millions; Austria, 78; France, 194½; Holland, 148½; Spain, 70; Popedom, 17; Bavaria, 11 millions.

In the panic, 59 commissions of bankruptcies were issued against 144 partners in country banks.

The total income, in 1803, was rated at 115,351,952*l*. & in 1812, at 130,057,746*l*. and perhaps if 33⅓ per cent. was added, for suppressions and exclusions, we should approximate the truth in about 154 or 175 millions, at that time when money was but half its worth in 1832.

About 700 persons, in 1812, paid on 5,000*l*. and upwards, and about 450 on from 3,000 to 5,000*l*.

The expenditure of Great Britain, before the war waged by the court-party against France in 1793, averaged, in the previous seven years, 16 millions per annum, the income meeting the expenditure.

In the next seven years, the expenditure averaged 42 millions per annum, the income being raised by taxes to 22½ millions.

In the next seven years, 1800 to 1806, the expenditure averaged 67½ millions per annum, the income 42 millions.

In the next ten years, to 1816, the expenditure averaged 102½ millions per annum, the income 65½ millions.

From 1816 to 1832, the expenditure has averaged 56 millions per annum, and the income 58½.

In the two last years the expenditure was 51½, and the income 52½ millions.

The income is now kept up by corn duties, the customs in other articles regularly declining quarter after quarter. In the quarter Michaelmas, 1832, the excess over Michaelmas, 1831, arose entirely from excessive imports of corn.

The gross amount of country-notes, from 1807 to 1818, averaged 20 millions. The highest was 24 millions, in 1809 and 1810. From 1820 to 1825, they averaged but 10 millions. The Scotch banks were puny concerns, till they got an exclusive privilege to issue 1*l*. notes, not enjoyed in England.

In 1778, the bank-notes in circulation were 7,440,330*l*., in 1784 but 6,202,760*l*. and 1785 but 5,923,090*l*. The deposits in the bank down to the same year averaged 5 millions, and its stock of corn and bullion averaged 3 millions, though, in 1784, it was 655,840*l*. The balance of the assets in favour of the bank averaged 1½ million.

In 1690, the bank-notes became 10 millions, the deposits were 6½ millions, the coin and bullion 8½ millions, and the balance of assets 2.7 millions.

In 1797, the year of suspension, the bank-notes averaged 9,674,780*l*., the deposits were 4.9 millions, the coin and bullion but 1 million, and the balance of assets 3,357,610*l*.

In 1815, 1816, and 1817, the bank liabilities averaged 39 millions, the bank-notes being 27¼ millions, and the depo

sits 11½. The coin and bullion varied from 2 to 9½ millions, and the balance of assets was 7 millions.

In the last 10 years the average of notes has been 19 millions, the deposits 9 millions, the bullion and coin has varied from 13 to 2½ millions, and the balance of assets has been 3 to 2½ millions; in 1832, 2,637,760*l.*

The highest amounts of bank-notes have been 27½ millions on the average of a year (1815;) the highest average amount of notes for a year under 5*l.* 9 millions, (1816;) the highest deposits 12½ millions (1814;) the highest liabilities 39.4 millions (1816;) the highest amount held of public securities 27½ millions; of private securities 24 millions; the highest amount of cash and bullion 13.8 millions (1824;) the highest amount of assets (1816,) 48 millions, and the highest amount of balance of assets (1816,) 8,639,680*l.*

The balance of assets of the Bank of England have fallen from 8.6 millions in 1816, to 2.6 millions in 1832. The assets in 1832 are 18,497,448*l.*, public securities 5,836,042*l.*, private and coin and bullion 5,293,150*l.*; the liabilities being in notes 18 millions, and deposits 9 millions.—*Marshall.*

Since the peace there have been 44 millions sterling of gold coined, of which five-eighths are considered as being sent abroad or melted, two-eighths hoarded, and one-eighth or 5½ millions in general circulation.

After 10 years, 229,100*l.* of 1*l.* and 2*l.* notes have not returned to the bank, being a 24th of the previous circulation. Private bankers find that a similar proportion do not come in of their average circulation on a series of years.

The payments of this year will reduce the debt of the United States, after January, 1833, to 6,962,600 dollars. In 1816, it was 127,334,933 dollars.

Notes less than 5*l.* were prohibited by an act of 1826, after April 5, 1829, except in Scotland, where they confer peculiar advantages on Scotch trade, agriculture, manufactures, and banking.

The Bank of Scotland, and the Royal Bank of Scotland, have each capitals of one million and a half, and the British Linen Banking Company of half a million, all chartered. There are 34 banks in Scotland, of which, 15 are joint-stock companies.

The capital of the Bank of Ireland is three millions. Its notes are about six millions; two of which are under 5*l.*; and it has several branches. There are about 30 country banks in Ireland.

The Bank of Venice was founded in 1171. The new bank of Holland has a capital of five millions of florins. The new bank of France, of ninety millions of francs. The Hamburgh, is a bullion bank, receiving at 444 shillings per mark, and paying at 442. The Petersburgh commercial bank is on the Hamburgh plan, and has a capital of thirty millions of rubles. The Philadelphia government bank has a capital of thirty-five millions of dollars. There are 350 in the United States, with capitals of 120 millions dollars.

At Bornou, narrow strips of cloth are used instead of coin.—*Denham.*

Six per cent. is the legal interest in the West Indies.

The wages of agricultural labourers was, in

1742	(per week)	6*s.*	1802	(per week)	9*s.*
1762	do.	7*s.*	1822	do.	8*s.*
1782	do.	8*s.*	1828	do.	7*s.*

Lord Teynham stated, that, in 1829, the wages of farming labour was reduced to 3*s.* per week; and, in some cases to 1*s.* 10*d.*

In 1729, *Flesh Meat* was 29*s.* 8*d.* per cwt.; in 1780, was 32*s.* 6*d.*; in 1818, 59*s.*

In 1730, *Bread* was 1*d.* for 14½ ozs.; in 1780, 1*d.* for 11⅝ ozs.; in 1830, 1*d.* for 8 ozs.

In 1730, *Fresh Butter* was 5*d.* per lb.; in 1780, 6*d.*; and, in 1830, 1*s.* 2*d.*

Cheese, in 1730, was 3½*d.*; in 1790, 4*d.*; and, in 1818, 6*d.*

Peas, in 1729, were 4*s.*; in 1780, 7*s.* 6*d.*; and, in 1818, 10*s.* 9*d.* per bushel.

Flour, in 1790, was 43*s.* 4*d.*; in 1810, 88*s.*; and, in 1818, 65*s.* 11*d.*

Oatmeal, in 1730, was 4*s.* 6*d.*; in 1780, 5*s.* 3*d.*; and, in 1818, 13*s.* 6*d.*

In 1730, *Malt* was 29*s.* per quarter; in 1780, 31*s.* 1*d.*; and, in 1818, 83*s.* 9*d.*

In 1730, *Hops* were 45*s.* per cwt.; in 1780, 55*s.*; and, in 1818, 155*s.*

In 1730, *Carpenters* got 2*s.* 6*d.* per day; in 1780, 3*s.*; and, in 1818, 5*s.*

In 1730, *Bricklayers* got 2*s.* 6*d.*; in 1780, 2*s.* 6*d.*; and, in 1818, 5*s.*; *Masons* and *Plumbers* the same.

Candles were, per dozen lbs., in 1730, 6*s.* 4*d.*; in 1780, 6*s.* 9*d.*; and, in 1818, 11*s.* 1*d.*

Shoes, in 1730, were 4*s.*; in 1780, 4*s.*; and, in 1830, 8*s.* to 12*s.*

Coals, in 1730, at London, were 28*s.* 5*d.* per chaldron; in 1780, 37*s.* 3*d.*; and, in 1829, 48*s.*

Since 1770, the various expences of farming had risen, in England, 52 per cent.; and, in Scotland, 70 per cent.

The expense of cultivating a farm of 100 acres, including rent, tithes, rates, and direct taxes, was, in 1790, about 410*l.* In 1803, about 550*l.* In 1813, about 772*l.*; and, in 1823, about 900*l.* The produce of good land is generally divided one-third for rent, one-third for expenses, and one-third for profit;

but, for inferior land, rent is taken at one-fourth.

Prices under the Paper System and the Metallic System varied, in 11 *years, as under:—*

	1819.	1830.
Wheat	79*s*. 3*d*.	56*s*. 1*d*.
Barley	60*s*. 2*d*.	29*s*. 6*d*.
Oats	32*s*. 6*d*.	25*s*. 6*d*.
Hay	7*l*. 10*s*. 0*d*.	4*l*. 0*s*. 0*d*.
Beef	4*s*. 11*d*.	3*s*. 6*d*.
Mutton	6*s*. 0*d*.	4*s*. 0*d*.
Cheese	4*l*. 18*s*. 0*d*.	3*l*. 16*s*. 0*d*.
Butter	5*l*. 5*s*. 0*d*.	3*l*. 8*s*. 0*d*.
Iron	9*l*. 0*s*. 0*d*.	5*l*. 8*s*. 0*d*.
Ditto (bars)	13*s*. 10*d*.	7*s*. 2*d*.
Lead (ton)	26*s*. 0*d*.	14*s*. 10*d*.
Copper, per lb.	1*s*. 4*d*.	0*s*. 11*d*.
Cotton Prints	18*s*. 0*d*.	8*s*. 6*d*.
Do. Shirting	0*s*. 9*d*.	0*s*. 4½*d*.
Calico	12*s*. 0*d*.	6*s*. 9*d*.
Muslin	1*s*. 0*d*.	0*s*. 6½*d*.
Irish Linen	2*s*. 3*d*.	1*s*. 6*d*.
Coffee	7*l*. 9*s*. 0*d*.	2*l*. 10*s*. 0*d*.
Rice	2*l*. 6*s*. 0*d*.	1*l*. 12*s*. 0*d*.
Tea	2*s*. 4*d*.	1*s*. 5*d*.
Do.	5*s*. 0*d*.	4*s*. 3*d*.
Sugar	59*s*. 9*d*.	27*s*. 7*d*.
Rum	4*s*. 0*d*.	2*s*. 9*d*.
Brandy	5*s*. 3*d*.	3*s*. 3*d*.
Cotton (W. I.)	1*s*. 3*d*.	0*s*. 5*d*.
Do. (Georgia)	1*s*. 6*d*.	0*s*. 6*d*.
Silk	3*l*. 8*s*. 0*d*.	1*l*. 10*s*. 0*d*.
Do. (British)	1*l*. 7*s*. 0*d*.	15*s*. 0*d*.
Wool	2*l*. 13*s*. 0*d*.	17*s*. 6*d*.
Paper	25*s*. 0*d*.	20*s*. 0*d*.

Taxes the same. Rents but a trifling less. Money at equal interest. Lawyer's fees the same, and laws oppressive.

In the ten years, from 1797 to 1807, the prices of the following commodities increased:—beef, 28 per cent.; mutton, 21; lamb, 50; pork, 37; butter, 46; cheese, 23; bread, 56 per cent.

The contracting price for maintaining, clothing, and every other expense of the poor, is often in the agricultural parishes 3*s*. per head per week, and this includes nourishment for the sick, and the support of the decrepid and worn out.

In Wilkins's Leges Saxon, we have prices of various articles in England in the reign of Ethelred, about the year 997, which, in money of the present time, gives, as the price of a man or slave, 2*l*. 16*s*. 3*d*. sterling; a horse, 1*l*. 15*s*. 2*d*.; a mare or colt, 1*l*. 3*s*. 5*d*.; an ass or mule, 14*s*. 1*d*.; an ox, 7*s*.; a cow, 6*s*. 2*d*.; a swine, 1*s*. 10*d*.; a sheep, 1*s*. 2*d*.; a goat, 4*d*.

In 1819, beef sold from 4*s*. to 5*s*.; in 1832, from 3*s*. 2*d*. to 4*s*. 2*d*. In 1819, mutton, 5*s*. to 6*s*. 4*d*.; in 1832, 3*s*. to 4*s*. 4*d*. In 1819, wheat from 64*s*. to 82*s*. but, in 1832, from 45*s*. to 72*s*. In 1819, coals from 38*s*. 6*d*. to 47*s*.; but 1832, from 25*s*. to 31*s*.

POLITICAL ECONOMY.

Political Economy is a speculative science, whose data are often vague, and conclusions subject to the errors of system. When founded on arithmetic, its reasonings do not in general apply to society, which is a compound of facts, affections, and passions, not to be controlled by the despotism of figures; while the multiplied relations of society constantly baffle isolated considerations. Nevertheless, it has corrected some errors, and established a few truths amidst a greater number of absurd and mischievous dogmas.

The first book of the modern principles of political economy, was the treatise of Sir Dudley North, in 1691, entitled "Discourses on Trade, principally directed to the cases of interest, coinage, clipping, and increase of money." Nothing of importance appeared in England from that time till the publication of Sir James Steuart's Principles of Political Economy, about the year 1768, which was completely superceded by Dr. Adam Smith's Wealth of Nations, in 1776. Political Economy was first treated as a science by the French "Economists;" at the head of whom was Dr. Francois Quesnay, Physician to Louis XIV. In 1758 he published his Tableau Economique, et Maximes Generales du Gouvernement Economique.

Dr. Quesnay was followed in the same career, by the Marquis Mirabeau the elder, M. Merciere de la Riviere, M. Dupont Nemours, M. Turgot, and his biographer Condorcet.—They did much to introduce the genuine principles of free trade, and the liberal notions that characterize the modern science of political economy. From this time to the publication of Dr. Adam Smith's Wealth of Nations, in 1776, nothing appears to have been done worth detailed notice in addition to the labours of the Economists.

The next step in the advancement of this science, was the Essay on the principle of Population of Mr. Malthus. The intent of this Essay was to shew, That Population depends on subsistence; men and women cannot be raised unless they have food to eat. 2d. That plenty of food encreases population, by enabling marriages to take place, and children to be raised. All this had been observed before by M. Herbert in his Essai sur la Police des Grains, 1755; by Mr. Wallace, in his treatise on the numbers of mankind; by Dr. Darwin, in his Botanic Garden; and by Mr. Townsend, in his Dissertation on the Poor Laws, 1786.

The works of M. Storch, of Peters-

burgh; of M. Ganilh; of M. Sismondi; but above all of M. Say; have contributed to throw light on this science, among the enquirers of the continent.

In Great Britain, during this period, the most important work published, was "The Principles of Political Economy and Taxation," by Ricardo, 1817.

The positions thus laid down by Ricardo have been followed by M'Culloch and Mill; and constitute the difference between the old school of Dr. Adam Smith, and the new school.

It seems to be agreed on all hands that no assumption of pretended knowledge ever wrought such frightful evils as the abstractions called Political Economy. It is the science of society in the hands of persons utterly ignorant of the details and workings of society, and it consists of specious theories always practically false, relative to the pursuits and fortunes of men, imagined by closet speculators, who literally know nothing of human nature. In general, too, the basest servility to wealth and power distinguishes the doctrines of this school, and to assist the rich in oppressing the poor with greater effect, and more plausibility, appears to be the object and end of its silly or wicked dogmas.

On all subjects connected with political statistics, the works of Mr. JOHN MARSHALL are phenomena in literature. They reduce all the relations of society to the unerring precision of arithmetic, and the knowledge which they impart would improve the condition of the world, if men in *power* were not necessarily all-wise; and if members of parliament were less egotistical. But the usefulness of knowledge has its *limit*, in the circumstance that it seldom or never reaches those who have the power and opportunity of using it. It is the misfortune of mankind that authority is always in wisdom one entire generation behind the less employed or less conceited.

Professor THOMAS COOPER, of Charles Town, has published the most correct views in his lectures on Political Economy, and his work gives the science its most rational form.

Political Economy treats of the sources, the production, the distribution, the accumulation, and the consumption of national wealth: the effect of those institutions on society, which are immediately connected with the increase or diminution of national wealth: and the effects produced on society itself by its increase or diminution. The end and object of this branch of knowledge, is to shew in what manner, and by what means, the physical gratification of human wants can be most equitably, conveniently, certainly, and effectually distributed among all the classes of society.

Some of its more popular truths are the following:—

That national wealth does not consist in mere money or coin.

That what one nation gains by commerce or manufactures, another does not lose.

That national superiority does not depend on repressing the industry, and impoverishing the resources of other nations.

That it is not better to make at home every thing we want, rather than permit other nations to profit by selling to us.

That national prosperity is not to be judged of by the balances of trade, as represented by custom-house entries.

That statesmen and legislators do not know better how to direct the various branches of industry, and the employment of capital, than the individuals who draw their subsistence from them.

That commerce and manufactures cannot be aided by artificial restrictions, limitations, and modes of taxation.

That no country can be enriched by compelling the people to purchase, during an indefinite length of time, inferior commodities at exorbitant prices.

That capitals cannot be changed in their direction, and forced by governmental regulations out of their habitual channels, without injury to individuals, and disadvantage to national wealth.

That population is not always and by all means to be encouraged.

That luxury and profuse expenditure, by encouraging industry, are not beneficial to a country; and frugality the reverse.

That taxes impoverish a nation, though spent at home.

That high taxes are injurious, though they urge to great exertion; and, though spent at home, do not foster industry.

That governmental expenditure does not operate merely like taking money out of one hand to put into the other.

That a national debt is a national curse; and paper money synonimous with destitution.

That colonies are not advantageous to the mother-country, owing to any monopoly they afford.

That chartered companies, exclusive privileges, and monopolies, are injurious institutions, in regard to commerce and manufactures.

That national splendour is no sure sign of national wealth and national happiness.

That the prosperity and increasing riches of manufacturers is not the same thing as national prosperity.

That we should not make laws to increase the wealth and influence of great capitalists, and put the poor who work for them more completely under their subjection.

We ought not so to frame a national system, as to make the rich richer, and the poor poorer.

That it is expedient to allow an industrious man to purchase the articles he stands in need of, at the best market, and the cheapest rate.

That laws ought to operate with equal advantage to all classes of the community, and protect all classes equally.

That restrictions, high duties, and prohibitions on imported goods, do not render domestic manufactures cheap.

That restrictions, high duties, and prohibitions are not necessary to furnish employment for our people at home: agriculture and commerce, and the trades connected, being adequate for that purpose.

The best patriots are the advocates for free trade and free ports among all the nations of the earth.

The improvements of the human race are to be ascribed to the intense exertions of great cities.

Mankind pay best—1. Those who destroy them, heroes and warriors. 2. Those who cheat them, statesmen, priests, and quacks. 3. Those who amuse them, as singers, actors, dancers, and novel writers. But least of all those who speak truth, and instruct them.—*Cooper*.

Monopolists are rich and influential—who represents the poor?—*Cooper*.

Civilization rests on two bases, marriage, and property in land.

Wealth is a plentiful possession of those material objects on which exchangeable value has been conferred by human skill and labour—which are desired for the gratification of human wants—and which cannot be obtained by those who seek them, but by giving some other object in return, equally desirable to him who receives it. The wealth of an individual, or a nation, consists in the abundance and cheapness of those articles which are useful or desirable for the gratification of human wants. Hence wealth may increase where price diminishes. I can afford to lay out five shillings in silk stockings at the present price: let the price or exchangeable value be reduced one half: then one half of five shillings will answer to me an equal purpose.

Wealth is a relative term, for as there is only a certain amount of property in a country, so the possession of a large share by one man is the poverty of others. The wealth of individuals is therefore no benefit to the country, while as to others it is the cause of their poverty. If all the property in a country is worth a million, and one man has half a million, there remains but half a million for all others, and if nine or ten possess nine-tenths the rest would be poor. This principle of accumulation, the curse of advancing, or old society, is favoured by the substitution of money for barter; since goods could not be accumulated like money, and money is therefore properly denounced as the root of all evil, and it is declared that no rich man can enter the kingdom of heaven. To correct these mischiefs, the inducements to accumulation should be diminished by fixing a very low rate of interest for money in comparison with the wages of labour or the profits of industry. Money, as an artificial convenience, ought not to be allowed to be abstracted, and usurers should be systematically discouraged, for the general benefit of the whole community. Interest of money is the slavery of the borrower to the lender, and there ought to be as few slaves as possible, while the slavery which exists ought to be of the lightest kind.

The Sources of Wealth are the labour employed in conferring on a raw material some property or quality that renders it desirable. Skill and capital are usually necessary for this purpose; but these, by ultimate analysis, are resolvable into labour.

Public wealth is confidence, and the creation of debt. Money or property, if useful and really such, always implies a lender and a borrower,—a creditor and debtor. It is therefore as confidence, and is generated by the facility of creating capital by the lender, and using it by the borrower. It is affair of *plus* and *minus* among the people, and relative among themselves. If A. B. and C. have some money and some credit, they lend both to D. E. F. G. &c. who use it as capital, make profits, and pay interest to A. B. and C. This is public wealth, and of course capable of indefinite extensions with confidence and facility.

Credit and confidence are the parents of capital and wealth; but, in 1826, Liverpool, Canning, Huskisson, and Robinson, not only refused to assist in restoring credit and confidence, but aided in utterly destroying both; and, hence bankruptcy, insolvency, and misery has since spread over a country, which, but a year before, had been at the pinnacle of prosperity.

¶ What a lesson, in proof of the evanescent and equivocal character of commerce, are the Histories of Phœnicia, Tyre, Carthage, the Hanse Towns, Venice, Genoa, Holland, &c. and even our own East India Company, our West India interests, &c. &c. We do not seem to understand that wealth is individual, local, and relative, not national or absolute; and that, although individuals may be enriched as to other individuals, yet the average condition of the country remains as before. Money may be cheapened, circulation may be enlarged, and the creation of debts facilitated; but the public bubble bursts, the moment it is attempted to balance accounts. The value of capital to one man, implies debt in other men, and wealth and debt are like light and shadow.

Labour is human exertion, employed to produce or confer some desirable quality or property (that is, exchangeable value,) on some raw material. Hence, labour is the main or rather the only source of wealth. Labour is, for the most part, hired and exerted for the sake of the wages or remuneration paid by the employer. When we speak of labour, we usually refer to the mere bodily exertion of a day-labourer, exclusive of acquired skill.

It is one of the sins of governments that they neglect those who have no capital to meet fluctuations, arising either from the competition of machinery or foreign manufacture. The general welfare demands both, but individuals ought not to be ruined or destroyed, either by a new machine, or a foreign import. On making out a case, they ought in all instances to be temporarily provided for, till their industry can be directed into new channels. If it is a permanent public advantage, the public can well afford to pay two or three years purchase for it.

Capital is nothing without labourers or operatives, and without being through them put in activity. The origin of capital is the produce of industry, saved or reserved by frugality; or it is the result of good character by which a man becomes the depository of the capital or credit of others, paying them interest, and employing it for a profit beyond the interest.

Wages are that portion of the money-value of the commodity produced, which the labourer receives as his compensation; in other words, the money or other useful commodity given as a compensation to the labourer, for his labour. This must be so much as to ensure to the labourer and a moderate family, a portion of the necessaries of life, sufficient to sustain bodily strength. Hence, all taxes on the necessaries of life either enhance wages, or reduce the labourer to want. Wages are higher when combined with skill, which is acquired by previous labour, and may in fact be considered as capital. Thus the wages of a painter or sculptor are far greater than those of the weaver of the canvass, or the digger in the quarry.

While nature has provided enough for all, if equally divided, those who find less than their share, seem to be warranted in looking for subsistence to those who prefer to hold more than their share, provided they exert or are willing to exert the labour which nature demands before it yields its products. This question may be beset with difficulties, but it is a choice of evils, and wealth must either concede, or divide, or the poor be starved while there is enough for all.

Utility is real or fancied, conferred by skill, labour, and capital. Thus, a piece of glass made in to spectacles, has real utility conferred on it; a piece of glass cut in imitation of a diamond has fancied utility conferred upon it. In both cases exchangeable value—that is, some desirable quality has been artificially conferred on the rough and worthless material.

Productive Labour or Industry, is that which confers exchangeable value on any material object, which it did not possess before; or which confers skill and knowledge, which can be used in conferring value; or which are in themselves valuable and saleable, as the knowledge of a lawyer or an engineer.

Unproductive Labour or Industry, is that which is expended without producing value, or contributing to produce it.

Production, is the formation of any thing desirable, or that constitutes wealth. It is the result of labour.

Produce, is the effect of productive industry employed upon the soil or land.

Product, is the effect of productive industry employed in rendering any material substance valuable. A product generally depends on the productive agency of nature, of skill, labour, and capital. It is for the most part the combined result of these. Thus, in a steam-engine, the skill, labour, and capital, are employed to render the natural agents fire and water productive.

Land supplies raw material and food, and includes soil, waters, fisheries, vegetables, rocks, mines, and minerals.

Ingredients of Value, are the cost of the raw material, which is some-

times paid in the form of rent; as for brick-earth; for land containing porcelain clay; for a marble quarry; for ozier swamps on river banks, to make baskets; for a quarry of burr stone, for a mine, &c. The intrinsic value of raw material before any labour is bestowed upon it, depends on its plenty or scarcity, or the difficulty or facility with which it can be procured, and its capability of receiving value by means of skill, labour, and capital employed upon it. A handful of mud is of no value; a handful of raw diamonds may be of great value. The next ingredient of value, is wages of the labourer (that is labour) employed in producing and conferring value on this raw material; then the profits of the capital necessarily expended in purchasing the raw material, paying the wages, furnishing the tools and implements, &c. This also is reducible to labour.

Measure of Value, is the average money-price of the article in question, at the given time and place; and it is the average, because the money-market, or current price, will be sometimes a little higher, sometimes a little lower than the natural price, owing to temporary fluctuations in demand and supply. It is reducible to the quantity of labour the article can command. Money is the representative ultimately of labour.

Price, is the amount of other products which any useful article will command in exchange. This is exchangeable value. The elements of price may be considered as being wages and profits; whether rent or the cost of raw material ever enters into the calculation of price is doubted by some. In agricultural produce it certainly does not. In some cases, where the raw material is scarce and dear, it does.

Money Price, Market Price, Current Price, is the amount in current money which any useful or desirable article will command when exposed to sale. This depends permanently on the natural price, and occasionally on the demand compared with the supply. Market price is the price for the time being.

Real Price, or Natural Price, consists in the cost (if any) of the raw material, the amount paid in wages for the labour expended upon the article, and the usual profit on the capital employed upon it; all reducible to the labour expended upon it before it be fit for market. It is that price which will enable the seller to reproduce the article in the same market, with a reasonable profit. If this cannot be obtained, supply ceases. Prime cost will be this natural price, deducting the profit on the capital employed.

Social Price, is the price that commodities bring when influenced by restrictions, monopolies, taxes, and legislative regulations. Thus, the natural price of a bushel of wheat or the amount of labour necessary to grow it and bring it to market, is one thing; the price of the same wheat influenced by the corn laws of Great Britain, is one half more. This last is the social price.

Glut, is over-production: so that the market price falls below the natural price. A glut may be of a single commodity, or of a great number. It may be of longer, or shorter continuance. In England, for some years, it has been so extensive and continued, as to be almost general, owing probably to the immensely productive power of machinery, and the unequal distribution of wealth.

Raw Material, is any material object employed to receive value, or to have utility conferred upon it by human industry, skill, and capital. It has, therefore, a natural value dependant on its capability of receiving artificial values.

Exchangeable Value, is that property conferred on any raw material, by means of human skill, labour, and capital employed upon it, that makes it so desirable as to induce other persons to give for it some other valuable article or commodity in exchange. Human skill and labour therefore are productively expended, not in producing the commodity or article itself, but the useful or fashionable property which makes it desirable to and sought for by others—producing and conferring that value which causes the commodity to be in demand.

Revenue, Income, is the annual amount of money, or other valuable commodities, which a man is entitled to, or receives, whether as landholder in the form of rent—as agriculturist, manufacturer, or merchant in the form of profit—as a member of one of the learned professions in the form of fees—or as a magistrate or public officer in the form of salary—or in any other lawful way.

Expenditure, is that portion of a man's revenue which he lays out or expends for the gratification of his immediate wants; and which being consumed, produces no further profit or advantage than the gratification of his wants. This expenditure may be prudent or necessary, according to his situation in life; but he is nevertheless poorer in proportion.

Produce may be eaten up, worn out, destroyed, consumed, for the personal gratification of the possessor, without view to future profit. In this sense it is synonimous with expenditure, as above explained: and is unproductive; as the wines on a rich man's table. But it may be eaten up, worn out, destroyed, consumed, for the purpose of maintaining labourers, buildings, tools, machinery, &c. with a view to future profit: this is productive consumption. Productively or unproductively, whatever is produced is consumed on an average, in about a year. Governments are great consumers, and usually with enormous waste.

Capital, is that portion of a man's revenue which remains as a surplus or saving, after all his expenditures are made. A surplus which may be laid out to produce further profit or additional revenue.

Circulating Capital, is a popular phrase in use to express that mass of revenue, whether belonging to individuals or to the government of a nation, which is laid out and expended in commodities wanted, whether for immediate consumption or future profit; whether destroyed and consumed in the form of present expenditure, or destined to form a part of accumulated capital, as the basis and source of future additional income.

Circulating capital must not be confounded with circulating medium, which last consists of the gold and silver coin, and paper money of a country; and serves no other purpose than to facilitate, by means of a common standard of reference, the interchanges and barterings of the circulating capital, which is of far greater moment and amount.

Professor Cooper considers that capital seeking employment, is the source of prosperity and productive industry. It is the means of setting a-going the farmer, the manufacturer, and the merchant—therefore, the source of productive labour, wages, and subsistence.

Fixed Capital consists of the workshops, warehouses, buildings, tools, and other conveniences necessary to produce future profit by means of the capital thus vested in them. These, in mercantile and manufacturing language, constitute the plant of a merchant or manufacturer. The stables, the barn, the granary, the sheds, the carts, the waggons, ploughs, harrows, and other implements of husbandry, the horses, cattle, &c. of a farmer, constitute his plant or fixed capital. Plant is a metaphorical term, as if a man were planted and rooted where his fortune is to be made and grow.

Stock is the produce of accumulated labour, kept for the purpose of being employed with a view to further profit.

Profit is not the excess which a man receives for any saleable commodity beyond the real or natural price which includes profit, but the return in value which he receives for laying out and managing or superintending his capital. When a man brings to market an article possessing exchangeable value, it has already cost him the price of the raw material, the amount of wages employed upon it (greater in proportion to the skill required) and the legal interest of the capital employed upon it. This is the prime cost. To this he adds the usual profit upon his capital. The usual rate of profit in a country regulates the profit in particular cases. This usual rate of profit is principally regulated by the profit of agriculture, the earliest and most common of all employments, but attended with the minimum of profit.

Whenever the word capital is used, it means the representation of property, while, in poor countries, this property is generally real, and capital limited; but in countries rendered wealthy by artifice, it is merely the representation of a debt created by credit and confidence, between a lender and a borrower. British capital, since 1780 or 90, has generally been of this factitious description, directly or indirectly, owing to the facilities of creating currency and borrowing.

Considering that great distress has arisen among the industrious classes for want of means to circulate the wealth *they* can so easily produce, and that their distress is daily increasing, individuals desirous of removing this grievous evil, have determined to attempt its accomplishment: and for this purpose they have formed themselves into an association for relieving the productive classes from poverty by their own industry, and mutual exchange of labour for equal value of labour, under the denomination of an *Equitable Labour Exchange*, lately established in the institution of the industrious classes, Gray's Inn Road, with a capital unlimited.

Capital is never freely directed, but only to such objects as the capitalist understands. Hence, little capital is directed to complex trades, or to any trade, till the simplest sources of profit are supplied. Hence, the mischiefs of opposing public securities to the wants of trade and industry.

The incompatibility of a manufacturing system to provide for a people, and

assure permanent prosperity, is proved by the endless competition to sell cheapest. This competition begins with the needy and desperate, whose object it is to secure quick returns, with or without profit. They call for the first sacrifice on their defenceless labourers, and hence labour is beaten down below bare subsistence; while, to keep their trade, respectable capitalists are obliged to follow their example in price, and in payment for labour. Sets of such adventurers may be ruined one after another; but others arise, till the trade falls wholly into such hands, and is destroyed. Unless wisdom can legislate against this embryo of destruction, a manufacturing system has its limit in its own competition.

Rent is the price paid to a landowner, for the loan of capital in the form of land, of houses, warehouses, water-power, machinery, &c. Clear rent is that which remains to him, after deducting interest of capital, expences, and all out-goings. Rent is lower than profit; because the receiver of rent is put to no trouble, is called upon for no skill, and incurs no risk. At least, this is the case where rent is paid in money. Those who embark capital, as agriculturalists, merchants, or manufacturers, must employ their capital, under the direction of technical skill, previously and laboriously acquired; and they generally incur some risk of losing their profit, either from want or demand for the article, or insolvency in some of the purchasers.

Interest is the rent or compensation paid for the use of capital, generally of capital in the form of money loaned to some person, who, by the addition of technical skill, wishes to make profit of the capital so loaned. As interest, like rent, is received without any trouble or risk incurred by the lender, it is always much less than profit. Generally, the average profit or capital in any country is three times the amount of the usual rate of interest, where business is transacted by wholesale.

Productive Expenditure is capital saved out of revenue, and employed with a view of profit.

Unproductive Expenditure is that which is expended on articles that are consumed without any view to profit in consuming them: as in food, clothes, wine, amusements, &c. It does not however follow, that because expenditure takes place without any thing of value remaining, that it is useless. Useful expenditure is one thing, productive expenditure is another. It may be useful as the nourishment necessary to life. Still, not being so applied as to produce future profit, it is properly termed unproductive.

Unproductive Class is those members of society who do not labour in any manner, or whose labour may well be dispensed with, as contributing little or nothing to the gratification of those human wants in which it is innocent and desirable to indulge.

The objections to the theory of Malthus, that the misery and poverty of mankind arise from population increasing faster than subsistence, were urged with severity, because it is notorious, that the greater part of the misery and poverty of the people of Europe arise from the indulgencies and monopolies of wealth, rank, and power, for which his theories became an apology.

The British emigration, or monopoly committee, have been practising every seduction to persuade suffering industry to leave England. Lately, a rate was levied on Fulham parish, to enable this anti-social committee to export the underpaid labourers of that parish; and, horrible to relate, a number were exported. The market-gardeners were thus left without hands, and were obliged to import Irish; and actually some hundred Irish came to Fulham, to supply the places of the native labourers, which the committee had exported to woods or deserts.

Money is some article or commodity, real or imaginary, employed to supercede the necessity of bartering, or exchanging for each other, the innumerable variety of commodities that are demanded and supplied. So that every article may be valued in reference to some common standard of exchange, some common measure of value, which should, if possible, be devoid of value itself, except for this use to which it is applied. In some parts of Africa, the money consists of the shells called *cowries*; in other parts, of bars of iron. Most civilised countries have adopted the precious metals (gold and silver) as having an intrinsic value which fluctuates very little; for a common measure to be perfect, should be either of no value or of a value not subject to change. No known material possesses all the necessary qualities; the precious metals approach only to what we want.

Money, therefore, (whether coined money or paper money) has or should have no value itself; it is the unit or standard to which values are referred. It is the representative and exponent of wealth; it does not constitute wealth. A certain quantity in every country is necessary in proportion to the business carried on, to serve as a circulating medium, by means of which exchanges

are calculated and facilitated. But beyond this employment of money its accumulation is useless; or rather detrimental. For if it be more abundant than the demands of commerce for circulating medium require, the money price of every article rises in proportion, foreign commerce is impeded, and the coin is sent off to countries where it bears a higher price. Money coined out of gold and silver has, within 25 or 30 years, been gradually superceded in great part by paper money. Whether advantageously or not, all circumstances considered, is a question of doubt and limitation.

Bullion (gold and silver uncoined), which, when manufactured, have value as articles of commerce; for convenience and ornament independent of their use in coin. This value, as an useful and ornamental material, frequently occasions the market value of bullion to fluctuate; and operates as a considerable disadvantage in the use of these metals for coin. In the early stages of society, gold and silver being frequently found in a metallic form, were in greater plenty than iron and other metals, which required to be extracted by a long and difficult process from the ore. We see this in Homer's Iliad. The value of gold and silver, depending on their scarcity, and on the amount of labour necessarily expended in procuring them, fell greatly soon after the discovery and intercourse with Spanish America.

Circulating Medium is any kind of money, any common standard of measure or value, whether of metallic coin or paper, that passes currently in payment for commodities that are in demand. Currency is the same with circulating medium.

The panic of December, 1825, may be likened to a fright in a crowd, by which hundreds often lose their lives. The aid of government, or of police, was instantly required, but in this case denied; and the mischief aggravated by law, and by *special acts* of law, by which the victims were pursued as criminals. One-half the circulating medium was at once extinguished as to two-thirds of the community, and the other half accumulated for no useful purpose in the hands of parsimonious capitalists and usurers, who sought any security but that of traders, who had in the panic lost their credit. Such, till 1832, has been the condition of England, and yet the state and legislature continue blind and obstinate.

The circulating medium, currency, or coin of Europe, until about the middle of the last century, consisted chiefly of coin manufactured out of bullion: every country having its own coin, that served as a measure of value for all its domestic transactions, but was seldom employed out of the country. Abroad, coin passed, as it now does, only as bullion of a given weight and fineness; and therefore a loss was often suffered on remitting it to foreign parts, beside the risk of transmission and the expense of transmission. Hence arose the substitution of bills of exchange.

Paper Money, or paper currency, is usually considered as consisting of bankers' promissory notes, payable on demand. But these by no means constitute the whole of paper money, or even the most considerable part of it. The other kinds of paper money, in common use, are bank credits and bills of exchange, domestic and foreign, and merchants' drafts on each other. The merchant who draws this bill of exchange in consequence of having transmitted goods to the amount, either sells this bill to his neighbour, who has imported goods from the same country, or else he receives from his foreign debtor a bill of exchange in return, on some person in the country of the creditor, or within the circle of his dealings. The price of bills of exchange on a foreign country will depend, like every other commodity, on the demand and supply, and this will depend on the balance of trade between the two countries. If France sells to England to the amount of a million, and has bought from England to the amount of half a million, bills upon England will be plentiful and cheap in France, and bills on France will be comparatively scarce and dear in England. Exchange is limited by the trouble, expense, and risk of transmitting coin, for which it is a substitute. When the exchange demanded is higher than the risk and expense, the merchant refuses to buy a bill, but sends off his coin to pay the balance against him. Bills of exchange therefore are no more than contrivances to save the expense and risk of transmitting coin, and also to save the interest that coin will yield if employed at home during the interval of transmission.

Commerce is the sale and purchase, and general interchange of valuable commodities, by which the wants of men in society are supplied. It is divided into the home trade, the foreign trade, and the carrying trade. Commerce is popularly applied to the foreign trade. The object of commerce is the supply to one country of the productions of another; but avarice of profit leads to speculations and competitious which swell commerce to an

unnatural extent, cause supply to precede demand, and create more miseries than any other with which mankind were ever afflicted.

HOME TRADE, that sale and interchange of commodities which is carried on at home within a nation, and where the inhabitants of that nation are the sole customers and purchasers. The amount of the home trade, even in Great Britain, is about ten times the amount of the foreign trade. In every other country, from ten to twelve times. At home, each man spends about three-fourths of his income among his fellow-citizens. Foreigners purchase only what they are strongly tempted to buy.

FOREIGN TRADE is that commerce which is carried on between foreign nations. A merchant is employed in bringing valuable articles from a distant country where they are cheap, to another country where they are scarce and dear. A considerable benefit of foreign trade is, the mutual communication of improvements in all things relating to the comfort of human existence.

CARRYING TRADE, consists in the carrying exportable commodities from one nation to another, the gain consisting in the freight thus earned. This trade flourishes among neutrals when other nations are belligerents. Sometimes the neutral purchases the commodities of one belligerent and sells them to another.

The BALANCE OF TRADE has long been a bugbear with half-informed people, who look no further than custom-house entries; but, on a great scale, it is in fact in favour of every nation upon earth, or commerce neither would or could be carried on.

LUXURIES are any commodity purchased, not necessary or expedient, according to the rank and fortune of the purchaser, and that occasions a disproportionate expenditure of income.

STOCKS—PUBLIC FUNDS—NATIONAL DEBT arise when the taxes are inadequate to the exigencies of the state; government draws upon posterity, borrowing from individuals, and paying them such interest as is agreed upon for the capital so loaned. This capital does not any more exist. It has been spent, merged, dissipated. The debt remains. The stipulated interest with which the community is burdened, is made transferable and assignable. The stocks, funds, national debt, are words designating this interest, which has become annually payable to individuals, for the capital formerly loaned by themselves or those they represent. The individuals who pay the taxes, destined to discharge this annual interest, are burdened in proportion to the amount assessed upon them; and, as all who possess property raise its price in proportion to the burden on them, so all taxes fall on labour, which, as the last term, cannot shift on any other class.

During the period of paper circulation and war expenditure, from 1792 to 1815, money of account in Great Britain was reduced 300 per cent. in relative value, and an income of 3000*l.* did not really go further than one of 1000*l.* before 1792; but the nominal amount led to personal expenditure, in accordance with nominal incomes, by which all got in debt. From 1815 to 1825, on the contrary, money rose in relative value 100 per cent.; and, in 1826, the panic raised it another 100 per cent. in relative value, and prices fell unequally, but averaged those of 1792. Debts and obligations continued, however, in the nominal amounts of the reduced currency; and, hence two-thirds of the population were utterly ruined, and the effect was increased by the unchecked rapacity of lawyers.

POPULATION.—A Healthy Population is that number of people in a community which is sufficient to supply the demand of labour, but barely so. The great mass of the people live more fully, more happily, where there is a constant demand for labour, than where that demand is insufficient to employ those who have nothing but labour to subsist upon. Every man who places himself in the market as a labourer to be hired, comes in competition with every other man in the same situation; and this competition has a tendency to lower wages, and of course to detract from the comforts, and incroach upon the necessaries of life.

GOVERNMENT is a term usually employed to designate and comprise the persons who controul the legislation, and constitute the executive power of a nation. In almost every country, what is called the government is the most wantonly extravagant, and ill-managed establishment that the people have to support. This arises from mistakes in the political structure of the government. Mistakes, consisting in unnecessary officers of government, paid by extravagant and unnecessary salaries; in too much power conceded; or conceded for too long a period; and in the want of means to inforce sufficient responsibility on the part of those who govern. The system of government should be as plain to be understood, and as simple in its construction as possible. The agents and officers of government gain by mystery and complication.—*Professor Cooper.*

The petty and insolent tyranny of upstart authority characterizes the government of most, if not all Colonies; but Dutch, Spanish, and Portuguese Colonies, are not less distinguished for the remorseless cruelty of their several administrations.

Glory in war is derived solely from the justice of the war. Those who are victorious in an unjust war, have no higher glory than appertains to the success of a banditti. But this discrimination is not always made either by contemporaries or historians, and kings and courts confer meretricious distinctions on their successful generals, to excite them and to gloss over the injustice of the cause.

The best of all governments is that which performs its required duty, at the least expence to the people. Every political community or nation ought to be considered as instituted for the good and the benefit of the many who compose it, and not of the few who govern it.—*Cooper.*

The moral entity—the grammatical being called a nation, has been clothed with attributes that have no existence, except in the imagination of those who metamorphose a word into a thing.

No war ought to be undertaken, unless it is unavoidable, just, and necessary; and, unless the wrongs that provoke it exceed the mischiefs of a contest; and there can be no glory acquired in a war which is unjustly undertaken, and without such imminent danger to the public weal as war alone can avert. Victory, in an unjust and unnecessary war, is equivalent, in moral character, to the success of any plundering and cruel banditti. *Grotius.*

It signifies not, in regard to trade, what is the *amount* of money in circulation. It is not the amount, but its *steadiness*, on which social prosperity depends. All men in trade have obligations in money, and credit and confidence depend on payments being made when due and in full; not afterwards; not even next day, nor in part, even if 19*s.* 11¾*d.* in the pound! If money, therefore, is suddenly raised in value, or diminished in quantity, so as to cross obligations and their maturity, general commercial ruin is inevitable. A and B only may go first, but they drag in C; C involves D, and so on, till credit, which is the wealth and life's blood of a country, is destroyed. The ignorant ministers of England, in 1826, imagined, that if they left enough in circulation to enable men to pay 10*s.* or 15*s.* in the pound it was enough, and that the bankrupt laws were their personal relief; and by this mistake they destroyed credit in England for a generation and perhaps for ever.

THE COLONIES.

Nothing can be more unpromising than the colonial interests of England. Nature appears to work against a colonial system, and to plead for the independence of distant countries. The East India Company are in debt several millions, with impracticable assets. The West India proprietary are beggared by over-production in new colonies, by current expences and mortgages, and by the wearing out or exhaustion of land, by carrying away the crops. Such property was treated as perpetuity, and millions invested in it; but, it appears that exhaustion takes place in fifteen, twenty, or thirty years, and the crops do not afterwards sustain even the expences. Nature produces and reproduces from the same elements, but if these are carried away, exhaustion renders reproduction impossible. Consumption on the spot assures some return of manure, but consumption, at 6000 miles distance, affords no returns beneficial to the soil. This then is the limit of colonial wealth and production. Egypt has poured out its grain for 5000 years, but the Nile works a miracle in renewing the soil.

The English Colonies have a governor, lieutenant-governor, president of council, speaker of the assembly, chief-justice, attorney and solicitor-general, admiralty-judge, marshal, collector of customs, &c.; all appointed in England.

Lower Canada has a general governor, a lieutenant-governor, a bishop of Quebec; governors of Quebec and Gaspé, 10 judges, 13 of an executive council, and 28 of a legislative council. Upper Canada has a lieutenant-governor, 7 executive council, and 19 legislative.

Bengal is governed by a governor-general of India, and 2 others of a supreme council; with 3 secretaries, 3 judges, a bishop, &c. &c. Madras, Bombay, St. Helena, the Cape, the Mauritius, Ceylon, and Prince of Wales Island, have similar establishments.

Jamaica, besides the usual functionaries of colonial government, has a bishop of that island; and the Bahamas a Court of Admiralty, and Stamp office.

New South Wales has a governor, and council of 13, with 3 judges, attorney and solicitor-general, and other officers.

The following are the 37 British Colonies, which have establishments of local governments, of from 12 to 50 persons, appointed by the British administration:—

Antigua.	Barbadoes.
Bahama Islands.	Bengal.

Berbice.	Nevis.
Bermuda.	New Brunswick.
Bombay.	Nova Scotia.
Canada (Lower)	Newfoundland.
Canada (Upper)	New South Wales.
Cape of Good Hope	Norfolk Island.
Ceylon.	Prince of Wales's Island.
Demerara.	Sierra Leone.
Dominica.	St. Christopher's.
Gibraltar.	St. Helena.
Grenada.	St. Lucia.
Ionian Islands.	St. Vincent.
Jamaica.	Tobago.
Madras.	Trinidad.
Malta.	Van Dieman's Land
Mauritius.	Virgin Islands.
Mountserrat.	

The British territories, in India, consist of above 80 fiscal and judicial subdivisions or provinces. Under the government of Bengal, there are 56; under the Madras presidency there are 22, in which the total population is 13,508,535.

The East India Company's Debt, in 1794, was about seven millions; but, since the Burmese war, it has been upwards of sixty millions.

The dynasties that have been conquered by the British arms in India, were only of short duration—scarcely one of them had been in existence above a century. Of this description were the Nabob of Bengal, Bahar, and Orixa; the Nabob of Arcot, Tippoo Saib, and the Paishwa. There was nothing venerable in the remote antiquity of those dynasties, and the natives of India had no other attachment to them than what arose from their possession of power. The strength of the present generation did not exist when the Nabob of Bengal, Bahar, and Orixa, the Nabob of Arcot, and Tippoo Saib, were conquered. The immense population, calculated at upwards of 60 millions, which inhabits those conquered empires, now look for protection and happiness to the British Government alone.—*Bombay Petition.*

The presidency of Bombay consists of ten provinces, besides Bombay, and a territory in Cutch.

Principal Towns in Hindoostan, with their reputed Population:—

Benares	600,000	Poonah	110,000
Calcutta	500,000	Nagpoor	115,000
Madras	462,051	Baroda	100,000
Patna	312,000	Ahmedabad	100,000
Lucknow	200,000	Cashmere	100,000
Hyderabad	200,000	Farruckabad	70,000
Dacca	180,000	Mirzapoor	60,000
Bombay	170,000	Agra	60,000
Surat	160,000	Bareilly	60,000
Delhi	159,000	Aurungabad	60,000
Moorshedabad	150,000	Burdwan	54,000
		Bangalore	50,000

Hamilton calculates the area of all India at 1,280,000 British miles, and the same author estimates that the British possessions occupy 553,000 square miles, or forty parts in a hundred of the total extent of India. British political influence, however, embraces the whole indiscriminately.

The kingdom of Oude contains $17\frac{1}{2}$ millions of acres, and above six millions of inhabitants. The revenue is 70 lacs of rupees.

The Epochs of the British Dominion, in India, are as under:—

Two Charters, granted	1600 & 1609
Mogul's Firman, to permit four Factories	1612
Fort St. George built	1641
Bombay occupied	1668
Fort-William built	1698
Calcutta taken by Suraja Dowla	1756
—— and Hoogly retaken by Watson and Clive	1757
Battle of Passy, between Clive and Suraja Dowla . . . . June 23,	1757
The Great Mogul, Shah Alum, defeated . . . . . . 1760 and	1761
Lord Clive, Governor General	1765
War with the Nizam & Hyder Ali	1767
Warren Hastings, Governor-General,	1772
Pondicherry taken	1778
Death of Hyder Ali	1782
Tippoo Saib, his Son, makes War in connexion with France	1783
Pitt's Board of Controul Bill	1784
Marquis Wellesley, Governor Gen.	1798
Seringapatam taken	1799
Battle of Assye, between Arthur Wellesley, Scindia, and the Rajah of Berar . . . Sept. 23,	1803
War against Holkar	1804
Treaty with him	1805
Cornwallis dies Governor-General	——
Lord Minto, Governor-General	1807
The Marquis Hastings, ditto	1813
Lord Amherst . . . ditto	1823
Lord Wm. Bentinck ditto	1828

The salary of the Governor-General of Bengal is 244,181 rupees; and, of the other three members of council, is 293,017 rupees. There are residencies at Delhi, Lucknow, Gwalior, Nagpore, Hyderabad, Poonah, Nepaul, and Indore; and agencies at Joypore, Harowtee, Serowhee, Mhairwarra, Bundleeund, Mundlaiser, Bhopawar, Mahidpore, Baugur Oodeypore, Bhopaul, and Bahar.

From Bombay to Calcutta is 1300 miles; and, to Madras, 770. From Calcutta to Madras, 1030; to Delhi, 1060; to Patna, 400; to Benares, 565; to Poonah, 1200; to Surat, 1310; and, to Cape Comorin, 1231. From Madras to Seringapatam, 290; to Surat, 930; and, to Cape Comorin, 390. From Delhi to

Agra is 115 miles; to Bombay, 965; and, to Cape Comorin, 1415.

The Company maintain botanical gardens at Muggat, Thannet, and Scharunpore. And it has mints and assay-offices at Calcutta, Benares, Furruckabad, and Sangore.

Besides the College of Fort William, at Calcutta, with professors and 54 pensioned stndents, it supports colleges at Bhaugnlpore and Benares; and geological, mineralogical, zoological, and botanical agents liberally provided.

Bengal is divided into 24 pergunnahs, each with its judge and magistrate, registrar, &c.

The general government of Bengal costs 4,247,914; the judicial, 4,048,268; the revenue, 3,711,209; and the marine, 142,740 rupees; giving employment to 106,830 Europeans and natives. The Madras governmeut employs 40,794 and the Bombay about 775 Europeans, and 29,100 natives.

The revenues of Bengal, in 1827-8, were 14,869,692*l.*; Fort St. George, 5,541,038*l.*; Bombay, 2,686,611*l.*; and, Prince of Wales's Island, Singapore, and Malacca, 45,078*l.* Total, 22,857,224*l.* While the charges were 22,012,025*l.* Those for Bengal being 11,774,626*l.*; Fort St. George, 6,007,597. (more than revenue); Bombay, 4,033,477*l.*; and Prince of Wales's Island, 196,325*l.*

The total interest of debts was 1,920,532*l.*

St. Helena costs 120,571*l.*

The College of Fort William costs the Company 139,637 rupees; public instruction, 148,736; and roads, bridges, &c. 279,747 rupees, at 2*s.* each, or 8*d.* per pagoda; or 2*s.* 3*d.* per Bombay rupee.

The Assets of the Company, in 1828, *were as under :—*

	Territorial.	*Commercial.*
Bengal . . .	£12,303,748	£2,315,990
Madras . . .	6,979,112	421,078
Bombay . .	3,685,359	109,766
Prince of Wales's Island	140,018	——

The territorial debts being 42,510,638*l.*; and the excess of debts being 21,716,890*l.*

The factory charges at Cantoo, in 1827-8, were 64,867*l.*

The capital of the East India Company is six millions, paying a dividend of 10½ per cent. 1000*l.* stock gives one vote, and 10,000*l.* four votes. Of 2000 proprietors 1,490 have one vote, 396 two, 69 three, and 48 fonr votes. The concerns are governed by twenty-four directors in fourteen committees, six of whom go out every April.

The East India Company pay the dividends to proprietors, yet, in 1830, they assert a loss in their trade of nearly 600,000*l.*, independent of the China trade.

The number of British-born subjects in India is not 50,000. The natives in British pay are nearly 250,000, artillery, cavalry, and infantry.

The revenues of the Company are the land rents, formerly assessed by the native princes, amounting to 8¼ millions, an opium monopoly which yields 2 millions, a salt monopoly 2¼ millions, customs nearly a million, and other items, making in Bengal only 14¾. At Madras these items yield 5⅜ millions; at Bombay 2¾; and with other places altogether about 23,000,000*l.*

On May 1, 1828, the debts had swelled to 58¾ millions, against which stood the commercial stock 21¾, and the fortifications, &c. 27 millions, leaving a deficiency of 10 millions!

In twenty years last past, only six exhibited a surplus revenue of about 600,000*l.*, while fourteen exhibited a snrplus charge of two millions. The charges increase faster than the revenue. In 1809 they were as 13¾ millions to 16½, bnt, in 1827, as 21 millions to 22¾!

The charges and disbursements are 3 millions on the land rents; on the monopolies 1½ million; sundries 1 million; civil charges, judicial, marine, &c. 4¼ millions; military establishments 11½ millions; bnildings ¾ million, *interest of debt* 2 millions, expences in London 2 millions, making a total of 26¼ millions, or an excess of expences over revenue of 3½ millions.

In January 1831, their *assets* in merchandize, debts in India, &c. were not quite 26 millions, and in England abont 11 millions, making 37 millions; but their actnal debts were above 46 millions, exhibiting insolvency to the amonnt of 9 millions. But against this 9 millions, they set off 12 millions for their buildings in India and London, and their ships. What a frightful pictnre of insolvency—after 230 years struggle, and while they are still paying 10½ per cent. interest on other 6 millions of capital, actually sunk in the vortex.

The native army of the East India Company, disciplined in European tactics, is about 150,000 cavalry and infantry, spread over 400,000 squares miles of Hindoostan, or twice the surface of the United Kingdom. They have been employed since 1748, and their formation took place in 1757. They are usually called sepoys, and light and short.

The officers and men of the army, in 1831, were 116,000, besides 19,719 British. In the cavalry, the nett annual pay of the privates is 22*l.* 16*s.* 3*d.*; in the infantry, 18*l.* 5*s.*, or 1*s.* 3d. and 1*s.* per day. The seamen are 32,000, at 29*s.*

The quarterly sales of the East India Company are generally 3,600,000 lbs. of Bohea; 4,500,000 lbs. of Congou, Souchong, &c.; 850,000 lbs. of Singloe; 100,000 lbs. of Hyson Skins; and 250,000 lbs. of Hyson, or in these proportions.

Bohea, at Canton, sells at 5¼, Congou 11½, Souchong 17½, Hyson 25¾, and Gunpowder 32 pence. They are sold in London at 100 per cent. advance, and the duty is then equal to the selling price; so that the consumer pays eight times the Canton price. The sale of 30 millions of pounds per annum, taken at 1*s*. profit, yields the East India Company 1½ million.

1,860,000 lbs. of tea were imported by the Americans from Canton in 1828. 220,053 lbs. of tea were brought from Canton by the French in 1828.

The imports of Calcutta are from four to five millions, and the exports eight to nine, of which those to China are one million (two-thirds bullion), and those to Great Britain three and a-half millions.

In 1815-16, the East India Company bought at Canton 33 million lbs. of tea, for 2,157,687*l*.; and, in the same year, sold in London 26½ millions, for 4,102,668*l*.; the average yearly purchases and sales, from 1810 to 1820, were 25 millions.

The Bank of Bengal is in 500 shares, of 1000*l*. each. There are also four other banks, of high credit.

The East Indian population, subject to Britain, is computed at 68 millions, and that of our other colonies at 3 millions.

Alexandria, &c. used to vend 1½ millions of East India products, which cost in India but half a million.

The East India Company, in 1828, imported 7,065,180*l*. of goods, in Company's and private trade, and exported 4,467,673*l*. The Company's imports were not quite two millions and exports half a million.

The British Colonies amount in number to 37, inclusive of the British possessions of India. Of these, there have been captured 11, ceded 4, obtained by settlement 19.

The population of these colonies is, in North America, 911,229; British Guiana and the West Indies, whites, 40,485; free coloured people, 60,863; slaves, 694,530.—Total, 836,527. Crown Colonies, whites, 238,388; free coloured people, 977,407; slaves, including, of course, convicts, 146,899.—Total 1,322,409, or about 1⅓ million in 1832.

The imports from the whole, in 1829, in official value, were 11,508,943*l*.; official value of exports, 10,777,244; ships inwards, 2798; tonnage, 755,375; ships outwards, 2977; tonnage, 1,067,243.

The cost for raising sugar for contingent expenditure alone, in the British Colonies, is per cwt.	£0	15	8
In the Foreign Colonies	0	10	2½
The return required for capital invested in the British Colonies is	1	9	0
In the Foreign Colonies	0	12	8
The cost of rearing a slave in the British Colonies	87	0	0
The cost of purchasing and transporting a slave from Africa to Cuba or Brazil	45	0	0

Sugar netts to planters, after all charges of exports, 15*s*. or 16*s*. per cwt.; and rum 8*d*. per gallon, towards growth and production.

An estate in the best part of the colony of Demerara, with a gang of 500 negroes, produces, on an average, 800 hogsheads of sugar, which, at the king's beam, turn out 14 cwt. nett each, and 60 thousand gallons of rum.

An estate, at Demerara, with 200 negroes, in an average part of the colony, as to soil and local advantages, produces, on an average, 260 hogsheads of sugar, and 17,000 gallons of rum.

The British West Indies exported to Britain, in 1829, as under:—

1829. Imports from	Sugar. Cwt.	Rum. Gallons.	Coffee. lbs.
Jamaica	1,386,392	3,516,651	18,690,654
Demerara	778,804	1,682,625	4,680,118
Barbadoes	270,862	———	———
Berbice	86,814	201,362	2,482,898
St. Vincent	258,285	275,373	———
Trinidad	292,831	15,820	73,607
Grenada	218,460	394,289	———
Antigua	156,658	110,434	———
Tobago	90,633	370,733	———
Dominica	56,319	31,853	942,114
St. Lucia	79,926	38,113	303,499
St. Kitts	127,093	176,807	———

There are about 700,000 negro slaves, of all ages, in the British colonies.

Martinique contains 20,000 free and 81,000 slaves. Guadaloupe 15,000 and 96,000. Cayenne 2,500 and 18,000. Bourbon 18,000 and 61,000.

Guyana is the coast from the Orinoco to the Amazons, about 700 miles. The English, to the north, 200 miles; the Dutch, next, 200; and the French 300. The territories run 300 miles into the interior. The chief places of British Guyana, or Demerara, are Stabrock and George Town; of Dutch, or Surinam, is Paramaribo; and of French, Cayenne. They are close to the Equator; *i. e.* between 2° and 8° N. lat.

Honduras yields about 10,000 tons of mahogany, and Jamaica and St. Domingo about 1000; Jamaica also ex-

ports 2½ millions lbs. of pimento; ginger, 12,300 cwts.; and half a million lbs. of arrow-root; besides castor-oil, preserves, &c.

The Bermudas produce the best arrow-root, and some coffee and sugar, besides cedar.

The Bahamas export salt, turtles, and some cotton.

The Canadas export to Great Britain about a million loads of timber, furs to the amount of 100,000*l.*, some wheat, and 20 to 30,000 barrels of pot and pearl ashes; besides lumber to the West Indies.

Exports from Canada, in 1830:—

Oak, 26,000 loads, at 50*s.*	£65,750
Pine, 334,000 at 15*s.*	250,000
Other square woods, 50,000, at 20*s.*	50,000
Staves, sd. 20,000 gt. hd. at 32*l.* per 1200	64,000
Ditto, West India, 30,000 gt. hd. at 10*l.* per 1200	30,000
	£159,750

Deals, 18,000 gt. hd. at 7*l.* per 120 126,000*l.*

1,100,000 trees, or loads of 50 cubit feet each, were imported from Canada, and other countries, in 1829.

The population of the two Canadas is 612,000; and of other North American Colonies, 300,000 nearly. Of the 19 West India Colonies, 850,000; five-eighths slaves, five-sixteenths free coloured, and only one-sixteenth whites. The imports, from the former, are 1,088,622*l.*; and from the West Indies, 9,087,914*l.* The exports to the former, 2,061,126*l.*; and, to the latter, 5,521,169*l.*

The water and canal communications in Canada are made perfect both by nature and art. Ships can sail from the Atlantic 1500 miles, on the St. Lawrence, the canals, and Lakes Erie, Ontario, and Huron, as far as the Channel to Lake Superior. Canals, too, are made by connecting the higher levels of the lakes at their entrance and exit, by banks, instead of deep cutting.

The Welland Canal now opened joins Lakes Erie and Ontario, hitherto disjoined by Niagara.

Lake Erie is 565 feet above the Hudson, at Albany. The communication is opened by the Erie Canal, 363 miles long, with 84 locks, 650 fall, and 48 rise. It cost one and a half million sterling.

Colonies ought never to be thought of but to get rid of superfluous population. They add nothing to the wealth and nothing to the strength of an empire. THEY ARE WAR-BREEDERS.—*Cooper*.

Colonization takes place when a people, from bad government, cannot live at home; or when a country finds another unused, whose climate enables it to cultivate other produce, with an identity of interests between the mother-country and the colony. The latter is the foundation of the West India and tropical European colonies; and, the former, the foundation of the colonies of Canada and Nova Scotia.

The Emigrations per annum, in 1827-8 and 9, are computed as follows:—

To France and the Continent	6,000
To the United States	25,000
To the Canadas, &c.	20,000
To the Brazils, &c.	5,000
To the Cape, &c.	2,000
To Van Dieman's Land, &c.	3,000
To other countries	5,000
	66,000

But the rate has quadrupled since.

The emigrations to Canada and the United States, in 1828, were 45,000. In 1829, 49,000. In 1830, 75,400. And, in 1831, 130,000. Perhaps half as many more to other parts of the world.

Captain Sturt has discovered rivers and a large lake in the interior of New Holland.

The Dutch have formed a permanent settlement in New Guinea.

Sir Walter Raleigh planted the first English colony in Raonoke Inlet, in Virginia, in 1584. His brother-in-law, Sir H. Gilbert, made an attempt, in 1578, but failed. Sir Walter's colony failed also, and so with others, for 20 years, owing to disease, famine, or the opposition of the natives.

The whole British Colonies, exclusive of Hindonstan, have a gross population of about 1,300,000; and they afford imports of two and a-half millions, and take exports of five and a quarter millions. The whole of these colonies employ three quarters of a million of tonnage.

Sugar-refining has lately been adopted with success in the West Indies, and the specimens on sale in London are real concentrations of the pure saccharine principle, and highly esteemed in families.

The local legislatures have, with becoming spirit, lately resisted the attempts to render Orders in Council equivalent to Acts of Parliament; and the perpetuity of this system, in the ceded colonies, has been resisted with great energy. All British subjects are under the laws only.

All our West India colonies, 15 in number, besides Jamaica and Demerara, send but ½ a million of sugar, 1½ of rum, and 1¼ of coffee, and the 15 cost nearly their entire produce.

FOREIGN TRADE.

Foreign and domestic commerce, as a means of enriching many individuals, excites the emulation of others, and thereby promotes general industry, and those combinations in useful enterprizes which indirectly produce public strength and wealth. The merchant who assembles in his stores desirable articles from foreign countries does not create, or steal from foreigners, but resembles a home accumulator, who abstracts large flocks and granaries by address or frugal habits. He varies in his new stock the means of indulgence, becoming himself relatively richer; but, in assembling exchangeable commodities to export, neither he nor the home accumulator increase the public stock. But their personal advantages stimulating others, general hope and industry are the consequence, and if absurd and wicked governments do not thwart, success begets confidence, and confidence general PERSONAL CREDIT, which then becomes the union of enterprize and strength, and the immediate result is public power and national wealth in proportion as CREDIT is more or less general.

The Imports of the United Kingdom in 1831 and 2, made up to Jan. 5, each year, were, at official value,

1831 46,245,242*l*.
1832 49,713,890

The Exports, at official value,

69,691,303*l*.
71,429,005

Of the last, COLONIAL PRODUCTS were

8,250,438*l*. in 1831
10,745,071 in 1832

But the real or declared value of all Exports was but

38,251,503*l*. in 1831
37,163,648 in 1832

being a deficiency, or loss, in

1831 of 31,439,800*l*.
1832 of 34,265,357

The value of the chief Imports in the year, to Jan. 5, 1832, were as under:

Ashes, pearl and pot	£ 279,838
Barilla, &c.	70,377
Bark, &c.	178,861
Brimstone	138,287
Butter	171,644
Cheese	192,641
Cochineal, &c.	180,747
Cocoa	76,860
Coffee	2,649,008
Corn, flour, &c.	4,671,354
Cottons of India	316,775
Currants	223,538
Dye—logwood	165,800
—— Mahogany	113,974
Flax and tow	1,879,043
Furs	238,103
Gum lac	£75,654
Hemp	434,399
Hides	792,665
Indigo	983,343
Iron, bar	170,162
Lemons and oranges	66,186
Linens, foreign	67,838
Madder	543,200
Molasses	218,440
Olive oil	551,093
Oil, palm	164,760
—— train	490,164
Pepper	104,458
Quicksilver	62,857
Raisins	147,688
Rhubarb	87,747
Rice	165,449
Saltpetre	107,864
Seeds	63,194
—— flax, &c.	315,798
—— rape	52,060
Silk, raw	1,557,018
—— thrown	757,713
—— India	446,402
—— European	238,103
Spelter	191,032
Spirits, brandy	198,582
—— rum	675,509
—— sugar	6,935,966
Tallow	1,062,235
Tar	108,181
Tea	3,161,893
Timber,—deals	64,161
—— masts	84,537
—— fir	357,214
Tobacco and snuff	305,248
Turpentine	158,540
Whale fins	56,148
Wines	752,284
Wool, cotton	9,516,087
—— sheep's	89,172
Yarn, linen	95,046

Chief articles EXPORTED, of NATIVE PRODUCE and MANUFACTURE, per accounts Jan. 5, 1832, at official value:

Apparel and slops	£368,545
Arms, &c.	459,579
Beef and pork	55,994
Books	17,395
Brass and copper articles	959,971
Coals and culm	435,000
Cotton manufactures	32,082,476
—— yarn	5,674,600
Earthenware	97,409
Fish	190,686
Glass	116,726
Hardware and cutlery	967,794
Hats	135,911
Painters' colours	101,967
Plate and watches	188,245
Salt	328,049
Silk manufactures	469,077
Soap and candles	229,818
Stationery	177,698
Sugar, refined	1,638,678
Tin	79,458
—— wrought	228,116
Umbrellas	47,513

Wool, sheep's	£121,789
Woollen manufactures	6,187,979

FOREIGN PRODUCE, re-exported, at official value.

Cassia Lignia	£71,877
Cinnamon	126,161
Cochineal	189,561
Coffee	1,404,906
Cocoa	51,688
Corn, flour, &c.	176,613
India cottons	549,299
Dye, logwood	83,306
Hides	168,520
Indigo	838,599
Iron, bar	50,183
Mace	60,605
Olive oil	139,364
Pepper	370,675
Pimento	59,707
Rice	88,612
Saltpetre	65,546
Silk, raw	203,295
Skins and furs	64,218
Spelter	156,709
Spirits, brandy	144,296
——— geneva	55,346
——— rum	733,291
Sugar	1,050,157
Tallow	111,925
Tobacco	176,552
Wines	181,211
Wool, cotton	1,626,075
——— sheep's	70,805

The foreign imports of Ireland in 1832 were but 1,552,228*l*., official value. The exports at official value 608,939*l*. and real 510,953*l*. The cotton manufactures exported were 220,632*l*. and linens 195,579*l*.

The exports at the British custom-houses are estimated at a standard rate of value, for the purpose of comparing, in equal values, one year with another. This official value was fixed in the reign of William III. On the other hand the merchants declare an invoice price, called the declared value, and, the difference between the two indicates the comparative profits of trade; for, if the official value expresses one million on a bulk of goods, and the declared value nn the same bulk is two millions, there is a comparative gain of one million; but, if the declared value is but half a million, then it is clear nnt only that half a million is lost, compared with ancient prices, but that 1½ million is lost as compared with the same goods at two millions at another perind.

The colonial and foreign produce, consumed in the United Kingdom, in 1825, 27, and 28, was 33½ millions each; and, in 1826, 24, and 1823, 26 millions. Till 1817, it varied from 12 to 19 millions.

Between 1798 and 1803, the total Imports were 29½ millions; the re-exports, 11½ millions; and the Exports of British produce and manufactures, 40½; affording a ratio of profit of 22½ millions.

The imports of Corn for several years form a very large proportion of our whole imports from Europe.

In 1817, it was 2,196,113*l*. corn out of 8,414,374*l*. and in 1818, 3,913,590*l*. out of 1,340,979*l*. In 1826, it was 2,117,391*l*. to 12,373,890*l*., in 1829, it was 3,500,433*l*. to 15,214,885*l*. and in 1830, it was 3,270,745*l*. to 16,092,617*l*.

The exports in real value to Russia were, in 1817, 3,045,475*l*.; in 1829 and 1830, only 2.925 millions in the two years.

In 1814, the exports to Sweden were 513,319*l*., but the last 12 years altogether have not made up that amount.

In 1814, Prussia received 1½ million, but, for the last 10 years, not 200,000*l*. per annum.

Germany, till 1822, took from five to six millions, but since then little above four millions.

France is steady, under half a millinn per annum!

Spain has fallen frnm 3½ millions in 1814, to 649,688*l*. in 1830.

Portugal has fallen from 3½ millions in 1814, to 1 million in 1828, 1¼ in 1829, and 1⅛ in 1830.

Italy is steady from two to three millions, and 3¼ in 1830.]

Gibraltar has fallen from 1⅓ million to ½.

Turkey has increased from ½ of a million to 1¼.

In 1814, the whole of our European exports were above 44½ millions, and in 1830 but 22¼, or only half.

Egypt and Africa has risen from 360 thousand to 730 thousand, Egypt taking 110 thousand in 1830.

New South Wales has risen from 30 or 40,000 to 316,000.

British North America has fallen from 4⅗ millions to 1⅓; and the United States from 13,255,374*l*. in 1815, to 5 or 6 millions of late years.

Brazil has risen from 2 millions to 2½.

The South American republics are steady, at nearly 3 millions per annum.

The East Indies and China have risen from 2½ millions to 4½.

The West Indies have fallen from seven millions, in 1814, to 2,838,148*l*. in 1830.

The ratio of the declared value, in 1814, to the official, was 150 to 100*l*., that is, 100*l*. official value in Europe, produced 150*l*. in return; from America, &c. 115*l*. and from India 129*l*.; but in 1819, 100*l*. of British goods, in official, produced but 98*l*. In Europe, 109*l*. in America, and 117*l*. in Asia; and, in 1830, fell to 57 in Europe, 69 in America, and 70 in Asia; while for the past year,

1832,—the 100*l.* official, *i. e.* the very same quantity, instead of yielding 150*l.* as in 1814, yielded but 48*l.* or 310 per cent. less than in 1814.—*Marshall.*

Formerly, it was the custom to add 50 per cent. to the official value to find the real value; but, in 1832, it is necessary to deduct 50 per cent. from the official to find the real value!

Mr. Marshall calculates the bills drawn by absentees residing in different parts of Europe at six millions per annum, since 1820. They are part of the means by which we get paid for the exports: for example, in 1830, we exported to Europe 22,291,978*l.* and imported but 16,092,617*l.*, and this six millions balanced the account. Yet this was a good year, for, in 1816, we imported but 4,658,419*l.*, and exported 30,645,221*l.*, when he calculates the absentee bills at only two millions. Foreigners seem to buy only as we find them the means to pay. Our loans, &c. were merely means of enabling our merchants to get paid.

There is a Board of Trade and Colonies, with commissioners, clerks, &c. &c. but none of them are traders.

There are British consuls at 126 foreign ports, or commercial cities, and about the same number from all foreign governments, in the ports and towns of the United Kingdom.

The East India Company is managed by 24 directors, chosen six per annum, by proprietors of 1,000*l.* stock and upwards, assisted by 1,000 secretaries, clerks, warehousemen, &c. &c.

For particular branches of commerce, there are a North American Company, Canada, Eastland, Hudson's Bay, Russia, South Sea, and Van Dieman's Land.

COTTON.—In the year 1831, by returns to Jan. 5, 1832, there were imported of raw cotton exactly 288,708,453 lbs. and re-exported 22,308,555 lbs.

Of the imports in 1831, the United States supplied 210,885,358 lbs. or *four-fifths*, Brazil 33,093,072 lbs. or *one-eighth*, and other *slave* countries 7½ millions, while the East Indies but 12.5 millions; Egypt and the Levant but 3.6 millions; in all free labour but 16.3 millions, or only one 16th.

COTTON MANUFACTURES.—In 1830, the declared value of the woven goods exported was 15,294,933*l.*, and of twist and yarn, 3,975,019*l.*; total exports 19,269,942*l.*—besides slops and haberdashery, value 772,834*l.* The official value or quantity was 41,317,848*l.*, and the difference of the declared and official, 21,869,184*l.*

In 1831, the declared value was but 17,259,055*l.*, and the official 39,577,724*l.*, the difference being 22,318,669*l.*

In 1830, the declared value of all exported manufactures of the United Kingdom was 38,271,597*l.*, hence the cotton manufacture was full one-half the whole.

Liverpool imported, in 1831, 793,400 bags of cotton, London 51,008, and Glasgow 60,000; total, 905,200 bags, equal to 280 millions of lbs. as above.

The cost, when landed, is about 7½ millions. The produce in various states of manufacture, allowing 10 per cent. for waste, is about 45 millions,—hence the gross profit exceeds the rental of all land.

17 millions worth are exported,—4½ in yarn and 12½ in cloth.

SUGAR.—In 1831, the imports were 5,366,263 cwts., of which the quantity from slave countries was 5,128,846 cwts., and only 237,417 cwts. from the East Indies, by free labour. The British West Indies and Mauritius produced of the preceding 4,021,299 cwts. and there were exported 1,409,841 cwts. The net duty was 4,650,589*l.*

COFFEE.—The imports, in 1831, were 43,007,828 lbs., of which the West Indies yielded 20,416,254 lbs., and Brazil 9,151,771 lbs., Singapore, &c. &c. 7½ millions, and Hayti 4 millions. The exports were 23,485,474 lbs. The consumption of coffee in Great Britain is 1 lb. per individual per ann.; and of tea nearly 2 lbs.; but coffee is so rapidly on the increase, that in 1804 it was but an oz. to a person, and it is now a lb.

TOBACCO.—The total imports, in 1831, were 24,743,808 lbs. of which 23,752,413 came from the United States, and half a-million from Columbia. The exports were 9,916,792 lbs., and the net duty 2,858,794*l.*

In Hayti, a free black colony, the exports in 1789 were 47½ million lbs. of clayed sugars, 93½ muscovado; of coffee 77 million lbs., and of cotton 7 million lbs. But, in 1826, no clayed sugar, 32,864 lbs. of muscovado, 32 million lbs. of coffee, and 620,972 lbs. of cotton; —facts brought forward by West India planters to prove that free labour cannot supply our manufactures, consumption, or revenue.

In 1831, there were imported 6,386,087 gallons of wine.

Portuguese . .	2,762,935
Spanish . . .	2,161,743

Cape a half million, French and Madeira a quarter, Sicilian, &c. a quarter. The duty 2*s.* 9*d.* on Cape, and 5*s.* 6*d.* on others. Net amount 1,535,484*l.*

The Imports in 1830 *were*—

Coffee . .	22,720,000 lbs.
Sugar . .	3,790,000 cwt.
Tea . .	30,000,000 lbs.
Tobacco and Snuff	19,800,000 lbs.
Wine . .	6,380,000 gal.

Cotton . .	270,000,000 lbs.
Silk . .	4,170,000 lbs.
Wool . .	31,600,000 lbs.
Tallow . .	1,130,000 cwt.
Flax . .	960,000 cwt.

The whole importation of Cape wines is under 600,000 gallons per annum, or 6,500 pipes, the value or cost of which at the Cape is about 49,000*l.*

The quantity of spirits exported from Ireland to England, during the year ending January 5, 1831, was 426,322 gallons. The quantity from Scotland was 2,724,221 gallons; and, to Ireland, 1,006,493 gallons.

The great articles of Import, as per DUTIES, were in 1831, to Jan. 5, 1832.

Butter, duty . .	£121,337
Corn and grain .	551,954
Coffee . . .	559,968
Hemp . . .	111,113
Molasses . . .	156,957
Raisins . . .	169,335
Seeds . . .	149,532
Silk . . .	260,000
Rum . . .	1,622,131
Brandy . .	1,378,092
Sugar . . .	5,346,128
Tallow . . .	138,558
Timber . . .	1,132,000
Tobacco . .	2,343,846
Wine . . .	1,401,593
Cotton wool . .	364,253
Sheep's wool . .	113,776

Ireland added 432,286*l.* to the enormous amount for sugar, and 620,795*l.* on tobacco and snuff, and 180,018*l.* on wines.

In 1700, the importation of cotton, chiefly from the Levant, was but 3,500 bales; and, in 1720, including colonial, was but 7,000, of 275 lbs. each.

Between 1802 and 1812, the average imports of cotton wool was about 300,000 bags of 260 lbs. each.

The exports of Russia, in 1830, were 274 millions of rubles, and the imports 198, with specie 48.

The proportions of imports of *cotton* manufactures, in 1829, were on 363 millions of yards, value 12½ millions; of cotton, *twist, and yarn*, 50 millions of lbs., value 3½ millions; of *linens*, 60¼ millions of yards, value 2½ millions; of woollens, 1,820,631 pieces, value 4,397,291*l.*; and 6,816,407 yards, value 527,476*l.* With other articles, forming a declared value of 36,812,756*l.*

In order, the United States, Germany, East Indies, West Indies, Brazil, Italy, the Netherlands, the Canadas, &c. and Russia, were our chief customers, from 5¾ millions to 1½. Portugal, Gibraltar, France, Spain, Cuba, Cape of Good Hope, Chili, Peru, Rio de la Plata, Guernsey, Malta, &c. were, in the second class, from 900,000 to 200,000.

Value of British Produce and Manufactures exported:—

(Including Ireland up to 1814.)

Years.	*Official Value.*	*Declared Value.*
1798	£19,672,503	£33,148,682
1799	24,084,213	38,942,498
1800	24,304,284	39,471,203
1801	25,719,980	41,770,354
1802	27,012,108	48,500,683
1803	25,125,893	45,102,330
1804	28,934,292	40,349,642
1805	25,003,308	41,068,942
1806	27,403,653	43,242,176
1807	25,190,762	40,479,865
1808	26,662,288	40,881,671
1809	35,107,439	50,242,761
1810	34,940,550	49,975,634
1811	24,109,931	34,917,281
1812	31,243,362	43,657,864
1813	32,000,000	43,000,000
(Exclusive of Ireland after)		
1814	32,200,580	43,447,372
1815	41,712,002	49,653,245
1816	34,774,520	40,328,940
1817	39,235,397	40,337,118
1818	41,963,527	45,188,250
1819	32,923,575	34,248,495
1820	37,818,036	35,568,670
1821	40,194,893	35,826,082
1822	43,558,490	36,176,897
1823	43,144,466	34,691,124
1824	48,030,037	37,573,918
1825	46,468,282	38,083,773
1826	40,332,104	30,847,638
1827	51,276,448	36,396,339
1828	52,029,151	36,152,799
1829	55,465,723	35,212,873
1830(U.K.)	60,492,637	37,691,302
1831	69,691,303	30,251,503
1832	71,429,005	37,163,648

The highest point of excess of *real* over *official* value was in the year ending 5th January, 1803, when the exports were:—

Real value .	45,103,330	
Official value .	25,125,893	
Excess of *real* value .		19,906,437

The lowest point of depreciation was in the year ending 5th Jan. 1832, when the exports were .—

Official value .	71,429,005	
Real value .	37,163,648	
Decrease of real value, making a depreciation in real value of . .		£34,265,357

Setting aside the official valuations, and comparing the actual value of the exports of later years with those of the former, a decrease will appear to have taken place in the foreign trade of the country:— .

Ten Years, ending	*Real Value.*
5th Jan. 1808 . . .	£37,335,763
Ditto — 1819 . . .	41,850,117
Ditto — 1832 , . .	37,163,648

The printed cottons exported were, official value, 14,456,925*l*., and, in declared value, only 6,097,491*l*.

The Imports, taken by official valuation, bear no proportion with the exports; the latter have increased, from 1789 to 1832, from 18 to 71 millions, being an advance of 53 millions; while the imports have increased in the same period only from 25 to 50 millions.

By Alderman Waithman's resolutions, relative to the cause of the impoverished state of the manufacturing operatives and their employers, it appears, that, with reference to the standard official values serving as a constant measure of increasing quantity, the real mercantile or declared value is portentously on the decrease.

In 1799, the official value, per measure and quantity, was 18,556,891*l*., and the real or invoice price was 31,252,836*l*. or 12,695,945*l*. *more*, and in 1803, the official increased to 25,195,893*l*., and the real value was 45,102,330*l*.; or nearly twenty millions *more*. But the exports, year after year, continued to increase per quantum, and, in 1819, were 38,176,225*l*.; while the real value had relatively fallen to 43,971,788 less than in 1803, and only 5,615,563 *more*. And thenceforward, the *real* value became less than the official, and in 1829, on 55½ millions of exports per official value, the real value was but 35¼ millions, or 20¼ millions *less*; all practices and circumstances continuing the same.

Then, as the 55¼ millions in the price of 1803 ought to have yielded 100 millions, and yielded but 35¾, it is contended that 66¼ millions are relatively lost to the operatives and manufactures, for equal labour and risk, of the United Kingdom; and, therefore, that this is *one* of the several causes of the wide-spread distresses of the people.

It appears, that the balance began to turn against our manufactures after the Milan and Berlin decrees, when it became necessary to smuggle, or export by circuitous means. It was one of the consequences of a wide-spread war, to retain Malta, contrary to the express terms of the solemn treaty of Amiens.

In comparing the exports in the same real value, it appears, that in the last twelve years there has been an average decline of exports of 6,332,508*l*.

The imports, as compared with the exports, have also fallen off. They increased, between 1798 and 1830, but 17 millions, from 25 to 42, while the exports have increased from 27 to 66; the difference in 1830 being 24 millions, and a difference of above 5 millions as to 1829.

The commerce of the United Kingdom, in 1823 and 1832, presents the following results:—

1823	Quantity of Exports	£44,218,394
1832	Do. do.	71,429,005
1823	Real value do.	36,726,897
1832	Do. do.	37,163,648
1823	Imports	34,555,370
1832	Do.	49,713,890

The Imports exceed the real value by the interest of foreign loans, which are so remitted; and the difference between the Imports and the official value, nearly 10 millions and 22 millions, is the depreciation of our goods in foreign markets by the operation of those interests on the bill-markets.

The part of the Exports consisting of colonial produce was, in 1823, nine millions, and in 1832, 11 millions; reducing the exports of British articles, in 1823, to 27¾ nearly, and, in 1832, to 26 nearly.

The Exports to Russia and France are one-third colonial, to Sweden and Prussia two-thirds, and to Holland above half.

The present produce of sugar, as a commercial object, is about half a million of tons, of which the British Colonies yield 220,000 tons, and the home consumption is 180,000 tons.

The consumption of sugar in Great Britain, in 1800, was 100,000 tons; in 1832, it is above 180,000 tons. In France, it is 100,000 tons, and, in other parts of Europe 150,000 tons. The British West Indies supply 185,000; the Mauritius and India nearly 60,000. Cuba, 90,000 tons; Brazil as much, and Louisiana now produces sugar.

AMERICAN TRADE TO CHINA.

Import and Export for Five Years.

1821-22	£3,306,004
1822-23	3,436,960
1823-24	2,597,893
1824-25	3,783,686
1825-26	3,576,862
Total	£16,701,405
Yearly average	3,340,281

E. I. COMPANY'S TRADE TO CHINA.

Import and Export for Five Years.

1821-22	£2,678,492
1822-23	2,630,002
1823-24	2,805,428
1824-25	2,500,898
1825-26	2,538,932
Total	£13,157,683
Yearly average	2,631,534

The Chinese government derive a revenue, from European trade, of 650,000*l*. The tea sales, in London, averaged 28,017,238 lbs. in the last 3 years; but this quantity yielded 630,000*l*. less than 25 millions in 1816. The freight is 4½*d*. per lb.

Since 1824, the East India Company have exported from China nothing but tea; hence, their demands for British goods have fallen two-thirds. The East India Company take about 30 million lbs. of tea, and the Americans about 12 millions.

The exports of woollen cloth to India were, in 1819, 12,000 pieces, value 200,000*l*., but, in 1828, only 8,530 pieces, value 63,918*l*. The cottons, in 1823, were 21,587 pieces, value 12,731*l*., but, in 1828, only 14 packages, value 306*l*. In brass and cutlery, in 1819, 12,535*l*., but, in 1829, 22,338*l*. In machinery, from 2,717*l*. to 30,203*l*. In stuff-goods, in 1819, 5860*l*., but, in 1828, only 2,037*l*.

The Americans purchase more green teas than the East India Company, though, in the gross, the latter buy twice as much as the former.

Tea was recognized with coffee, in a tax of 8d. per lb. in 1660; but the first importation of the East India Company was a single 100*l*. in 1667.

Tea, in China, is bought at so many *talc*, (6*s*.) per *picul*, (133⅓ lbs.)

The sorts of teas used in the United Kingdom are, 20 million lbs. of congou, 4 twankay, 4 bohea, 1 hyson, and 1 of four or five other sorts.

M'Culloch asserts, that the differences between the prices of tea in London and Hamburgh prove that the English people, since 1814, have paid 28,815,820*l*. more than they ought to have paid, if the East India Company had not a monopoly.

The consumption of tea is as under, in millions lbs.:—

Great Britain	26 lbs
Ireland	4½
United States	8
Russia	6
Holland	3
Germany	2
France, &c.	0½

The consumption of coffee increased, between 1807 and 1831, from 1.1 million lbs. to 22 millions.

Within 1831, there were landed at Liverpool, from Ireland,

Cows	90,715	
Sheep	134,702	
Pigs	150,001	
Calves	1,196	
Lambs	25,725	
Hams & tongues	590	Hhds.
Bacon	13,090	Bales
Pork	15,000	Barrels
Beef	6,391	Tierces
Ditto	1,189	Barrels
Butter	267,500	Firkins
Wheat	277,060	Quarters
Oats	380,670	Do.
Meal	149,816	Loads
Flour	93,154	Sacks.

The balance of trade is in favour of every country, or the merchants would retire from it. If against England with A, B, and C, it is in favour from D, E, F, G, H, and so with all nations. It is with a nation as with an individual. It is against him with his baker and wine-merchant, but in his favour with others, or he could not pay the baker and wine-merchant.

Free-trade at home is desirable, and the state is served, whether one district gain or lose; but free-trade with foreigners, unless their trade is as free with us, is the system of an unequal balance, and pregnant with mischief and ruin.—*Malthus.*

The home trade is to the foreign trade, in Great Britain, as 9 to 1. In France as 12 to 1. In the United States, 13 to 1. The disparity proves the wisdom of the Chinese and Japanese.

In 1700, our trade with Portugal was one-seventh of our foreign trade, and in 1832 it is but the 100th.

The African slave-trade is now reduced to very narrow limits. It is abolished, except in the Portuguese settlements, on both coasts, and these bigoted Christians have now little power of mischief.

Mr. Marshall maintains that the bills bought up on England by certain governments, to pay the interest on British loans to them, operates as a deduction for the like amount on the price of our manufactures; so that the interest of those loans is, in fact, paid by the manufacturing labour of England. Bills drawn in England for exports are, he proves, depreciated to the full value of those remittances for interest.

The United States imports for 12 months, to Sept. 30, 1832, were 103 millions of dollars (23 mil. sterling); and the exports 82 millions (17 mil. sterling.) New York alone was 57 and 25.

When, in 1796, the British ministry seized the colonies of their allies, the Dutch, spice-tree plants were at once conveyed to British colonies, rendering the Dutch spice islands of little further value.

Europe consumes thirty million lbs. of cocoa, and Great Britain but half a million.

France produces altogether, 8060 millions of gallons of wine, worth nearly 1,000 millions of francs, or 40 millions sterling; and about 25 millions of gallons of brandy and spirits, worth two francs per gallon, besides vinegar. They employ 3 millions of people, and are equal to the cotton manufactures of England, while they are native, and for the most part healthful employments. The silk trade is equally important, yet the French government

The vineyards near Bourdeaux yield a million of hogsheads of wine, of which 100,000 are converted into brandy. The red sorts sell, on the spot, from 3000 francs to 300 per ton of four hogsheads. The white sell from 1200 to 150 francs per ton of four hogsheads. 80,000 pieces of brandy and spirits of wine are exported from Bourdeaux. Cognac is on the Charente, and exports largely.

The Bourdeaux clarets are of three classes, and of several vintages of each class. The *first class*, or Medocs, consist of the Grand Crus, the Bourgeois Crus, and the Ordinaire Crus. The first are those of Chateau Margaux, Lafitte, Latour, and Haut Brion, most prized, and of which the production is only 3000 tons in the average of years. The Bourgeois is but half the price, and the Ordinaire but a fifth. The *second class* is the Vin de Grave and Emilion, at one-fifth of Medoc; and the *third class* is drank as beer, and made into brandy. They are generally sold in a mixed state by the merchants, and the whole produce of the neighbouring country is about 250,000 tons. The wine produced in all France is rated at 1060 millions of gallons, (not 8,060) and its value at as many francs; but a large portion is converted into spirits and brandy.

The vine flourishes between lat. 25° and 48°, and in America from 20° to 38°, and below 3,000 feet. It succeeds best in volcanic countries, and in light soils with a south-east aspect.

Port is produced chiefly in Upper Douro, and is mixed for exportation with 23 per cent. of spirits of wine. Its quantity 30,000 pipes.

Sherry is produced near Xeres, in Andalusia. Its quantity 15,000 pipes.

Champagne produces 220,000 pipes.

Burgundy 60,000 pipes.

Madeira 20,000 pipes.

Cape 6,000 pipes.

The United Kingdom imports from six to eight millions of gallons, Madeira as 1, Cape 2, French 1½, Portugal 12, Spain 8, others 1½.

The profits and monopoly of the Hudson's Bay Company stimulated, about 40 years ago, a number of Canada merchants to form a North-west Company, for the same objects. Since then, the Indian tribes of Labrador and the North have been distracted by the contentions of these companies; and, in 1814, no less than 19 of the Hudson's Bay Company were murdered by partizans of the other, near York Fort.

In 1828, 66 millions, and 1829, 64 millions of eggs were imported; from 60 to 56 millions from France, and six from the Netherlands.

In 1826, the United States exported 64,098 hogsheads of tobacco, each 1200 lbs. The United Kingdom consumed 11,467 hogsheads, which cost, in the United States, about 250,000*l*., and yielded in British revenue 2½ millions sterling! In 1829, the exports to Great Britain were 18,126 hogsheads.

In the same year the United States exported 857,820 barrels of flour, value 5½ millions of dollars; 111,063 tierces of rice, value 1.9 millions of dollars; and 161,880 barrels of beef and pork, value three millions.

The exports of cotton from the United States were, in 1806, 37½ millions lbs., value 8½ million dollars; and, in 1826, 204½ million lbs., value 25 million dollars. In 1831, it was 250 millions of lbs.

The exports of the products of the forests were 4 millions of dollars, and of the seas 1½.

The total of the exports, in 1826, was 77½ million dollars, and the imports 85 millions, at 4*s*. 4½*d*. each.

The American imports, during the year ending on the 30th September, 1831, amounted to 70,876,920 dollars. The exports amounted to 73,849,508 dollars, of which 59,462,029 dollars were of domestic, and 14,387,479 dollars of foreign articles.

The consumption of imports was, in value, 7½ million dollars of woollen manufactures; 6.12 millions cotton do.; 4.87 of silk do.; 2.56 of iron and steel; 1.53 of flax; 7 million lbs. of tea, value 2.44 million dollars; coffee 25 million lbs., value 2.7 million dollars; sugar 56 million lbs., value 3.57 million dollars. The whole consumption being 60½ millions, and the re-exports 24½ million dollars.

Two and a half million bushels of salt were imported from Great Britain in 1826; 69,000 barrels of ale and porter; 63,000 lbs. of gunpowder and 94,000 lbs. of shot; 1 million lbs. of iron castings; 2 million lbs. of sheet and hoop iron; and 15,347 cwt. of steel to the United States.

The cotton exported from the United States to Great Britain, in 1826, was 5.1 million lbs. Sea islands, and 127¾ of other sorts. The tobacco 26,134 hogsheads, the rice 20,521 tierces, and the skins and furs 406,000 dollars worth.

In 1830, New York exported of native produce 11 millions of dollars, and New Orleans 12.

In 1829, the American *exports* were, in *domestic* produce, 55,700,103 dollars value, and in foreign produce 16,658,478 dollars value, making 72,358,671 dollars. The *imports* were 74,492,527 dollars worth. In pounds sterling the *exports* were 15,526,564, and the *imports* 15,985,853.

The most interesting commercial novelty of the last few years is the application of cocoa-nut oil and palm-oil to the fabrication of candles and soap. They are cheap and abundant, and fragrant, instead of being noisome and offensive, like tallow, &c. Cocoa-nut palm-oil is as delicate as almond-oil, and African palm-oil is of the consistence of butter, and eaten as such in Brazil and Guinea. The cost, as imported, is from 3*d.* to 3½*d.* per lb. and the imports have doubled in a short period. At present, the candles are a trifle dearer than tallow, but the light is brighter, and there is much less smoke, while the combustion is fragrant and refreshing.

The Hanseatic League began about 1200, between Hamburgh and Lubeck. It then extended to Cologne, to Dantzic, and finally included eighty commercial cities, for the protection of the sea against pirates, &c. Every three years they held a congress, and becoming very rich they aimed at political influence, and hence the ruin of the League about 1600.

Trade in Germany is carried on in crafts or castes, like the city companies in London, but under severe regulations.

MANUFACTURES AND INDUSTRY.

The manufacturing districts of England are those in which beds of coal lie. Cheap fuel is essential to the steam-engine, and all metallic arts, and a high temperature is necessary to all fine spinning processes.

Manufactories are localized by the skill of the population in each particular line, and by the residence of machinists, and of all co-operative branches. This is the reason why manufactories cannot remove, or be established in foreign countries, since such various labour and skill is necessary to confer effect on the chief operation. It is also the reason why particular fabrics have peculiar excellencies, or faults, it being impossible to alter the habits of work-people in the most trifling detail. Hence, too, it is that factories are wrought even at a loss, for if the artizans and people are scattered they could not be brought together again.

The monopoly of farms, and the impulse of the manufacturing system, have enlarged the proportion of the manufacturers from 6 to 5 in 1801; to 8 to 5, in 1821; and 2 to 1, in 1830. The population has increased nearly 30 per cent. and the manufacturers 40.

A more wicked sophism cannot be advanced, than that if public policy destroys a manufacture, the capital can be diverted, and the operatives find other employments. Habit, skill, connexions, and arrangements, render it always difficult and hazardous, and generally altogether impossible, and ruinous. In practice, it is preferred even to seek a new country.

In 1830, about 16,000 steam-engines saved the labour of 450,000 horses, equal to two millions and a half of men, at 5⅔ men to a horse.

The hand looms in 1830 were, in Great Britain, about 240,000, and about 55,000 power looms, doing each the work of three hand looms.

Incorporated weavers of particular towns anciently produced peculiar colours, as Kendal, green; Coventry, blue; and Bristol, red.

The quantity of wool grown in England is about 93 millions of lbs.; but the staple being chiefly from 4 to 5 inches, and of a harsh wiry texture, it is unfit for making fine cloths, and therefore sold at a very reduced price, being chiefly used for worsted, convertible into stuffs, stockings, blankets, flannels, and carpets.

It is found that the wool of sheep deteriorates as the carcas of the animal is increased; hence, for some years, owing to the enlargement of English sheep by new breeds, the wool has become too long and coarse for fine or superfine cloths. Long and coarse wool will not mill, or produce the required substance of clothing. For the last 20 years, therefore, nearly all superfine cloth has been made of wool imported from Hamburgh and Bremen, called Saxony wool. These fleeces are produced from sheep which, within a century, were imported into Germany from Spain, and they now constitute immense flocks, in the flat countries of Prussia, Saxony, and Bohemia. Soil varies the quality of wool; and chalk renders it more like hair than wool.

Wool has the strongest affinity for colouring substances, silk next, and cotton and linen next. Oxyde of iron, dissolved in sulphuric acid, is a good mordant for wool; but, for cotton and linen, the oxide must be dissolved in acetic acid. Indigo, alone, is a good permanent colour; the rest are fixed by the affinities of mordants, which consist of earths, oxydes, tan, and oil. When cochineal is used as the colouring substance, if the mordant is alum, the colour is crimson; if oxide of iron, black. Shades are produced by tartar, salt, acetate of lead, sulphate of copper, sal ammonia, &c. *Blue* dyes are produced with indigo and woad, the former being dissolved in sulphuric acid, as sulphate of indigo. It dyes

wools and silks; but the indigo is usually deprived of its oxygen by fermentation with woad, and bran, and lime. The means are various, and not within the plan of this work. *Yellow* is dyed by weld, fustic, and quercitron bark. *Red* by kermes, cochineal, archil, madder, carthamus, and Brazil wood; with alumina and oxyde of tin for mordants. *Black* is dyed with red oxyde of iron and tan, with logwood. *Browns* are dyed with walnut-peels. Compound colours are produced by twice dyeing. Blues and yellows make different *greens;* blues and reds make *violet, purple, and lilac;* yellows and reds, *oranges;* black and other colours make *grays, drabs,* and *browns.*

In 1825, there was imported 28,800,000 lbs. of Saxony wool; and, in 1830, it was 26,000,000. In the last year, the Spanish was but 1,643,515. The total of all foreign wool being 32,313,059. In 1819, the total import was 16 millions; and, in 1819, the last register of quantity of cloth was only 6,924,000 broad, and 4,889,000 narrow; but, in 1813, there was 11,702,000 of broad, and 5,615,000 narrow. Saxony wool has increased from 28 lbs., in 1812, to an average of 25 millions; the Spanish, in 1812, was 2,148,000; and, in 1807, was 10,291,000. Spanish averages 2*s.* 4*d.*, and Saxony 3*s.* The 19 millions of British sheep yield per annum, of long and short, 93 millions, at an average of 8*d.*

Broad cloth is from 60 to 63 inches wide, and there are from 40 to 60 yards in a piece; the lower sorts being longest. A middle-size man takes 1¾ yards for a coat. A youth, 1½ yard. A stout or tall man, from 2 yards to 2¼.

Woollen cloths vary in price, not only in regard to fineness but to colours, from 13*s.* to 30*s.* for blacks and blues; from 2*l.* 2*s.* to 3*l.* 3*s.* for scarlets; from 2*l.* 10*s.* to 4*l.* 4*s.* for orange; and from 1*l.* 4*s.* to 2*l.* 5*s.* for crimson and French gray.

Plush is made of a woof of woollen thread and a double warp, one of hair and one of worsted.

One yard of superfine woollen cloth weighs 1 lb. 2 oz.; and 1 yard of kerseymere 11½ oz.

The cotton manufacturing district of Lancashire includes the parish of Manchester, equal to 60 square miles; Oldham, about 20 square miles; Rochdale, Middleton, Stockport, Bury, Oldham, Blackburn, &c., and the whole contained about 72,000 families, engaged chiefly in this fabric, which at 6½ made 468,000 souls, and now probably 80,000 families, and 520,000 souls.

Of these, the Manchester district contained, in 1831, about 32,000 families; Ashton, 4500; Oldham, 7000; Rochdale, 7500; Middleton, 2000; Bury, 6000; Bolton and Wigan, 4000; and other places 9000 more. In Derbyshire, Cheshire, and other districts, at least as many more, or half a million, dependent on this fabric: while, according to Marshall, the same work is nnw performed for 1*s.* 10*d.* for which 13*s.* was paid in 1814, and 16*s.* in 1802.

Of the raw material, it will take, to produce 1 lb. of net yarn, according to the number of hanks in the lb.

	lb.	oz.		lb.	oz.
No. 20 ...	1	2	No. 120 ...	1	6½
40 ...	1	3	140 ...	1	8
60 ...	1	3½	160 ...	1	10
80 ...	1	4½	180 ...	1	13
100 ...	1	5¼	200 ...	2	0

All above the lb. being wasted in the manufacture.

The numbers of cotton yarn nsed in cambrics are 40s. to 00s. for twist; and 50s. to 130s. for weft; and, in jacconets, 60s. to 100s. for twist; and 80s. to 100s. for weft.

There are about 5 yards in a pound weight of fine calico.

The prices of the spun cotton are from 15*d.* to 7*s.*

The numbers used in making the running white calicoes are—

No.1 (Lining) Stout calico, 20 T. 18 W.
2 (Printing) Super do. 28 — 28 —
3 Do. 74s do. 36 — 36 —
4 Power-loom cambric 40 — 40 —

No. 1 About 4 yards make a lb.
2 From 8 to 6.
3 From 8 to 7.
4 About 6 yards make a lb.

The prices of the spun cotton used in them on the average of 1827.8, and 9 were—No. 20, 11*d.* to 12½*d.*; No. 28, 12*d.* to 13½*d.*; No. 36, 13*d.* to 15*d.*; No. 40, 13½*d.* to 16*d.*

The cost of weaving and finishing a piece of 28 yards (Nos. 1, 2, and 3,) is weaving and dressing, from 14*d.* to 20*d.* No. 4, from 2*s.* to 3*s.*

Calico was first manufactnred in England in 1776; and Peel and Co. of Blackburn, gave 5*l.* 9*s.* 8*d.* for pieces to Thomas Dixbury. In 1829, similar pieces were sold at 8*s.* or 9*s.* each.

The word Calico is derived from Calicut, the city on the Malabar coast, where they used to be exported. It is made in England with thread, No. 24 or 26, and an 840 reed.

The muslin, commonly called book-muslin, was an Indian article, and by them called *bouk* muslin.

Scotland, of late years, has produced from 7 to 10 millions of cotton goods; and from a million to 1½ millions of linen goods.

The Sea-Island, Uplands, Demerara,

Berbice, Surinam, and Pernambuco, are the most approved sorts. The West and East Indian, and Brazil, fetch lower prices. The capital, per acre, is from 120*l.* to 160*l.*; and the average produce exceeds 200 lbs. The expense is from 6*d.* to 7*d.* per lb., which, with charges, is at least 8*d.*; and yet, for five or six years past, the lower kinds have been selling in the British ports from 5*d.* to 6*d.* per lb.

Taking a bag at an average of 260 lbs., the quantity left for manufacture, in 1829, was 623,822 bags, or 162 millions of lbs. Then, it appears, that 50 millions lbs. of twist and yarn were exported at a declared value of 3½ millions, or 1*s.* 5½*d.* per lb., giving, after deducting one-fifth for waste, an average advance for manufacture of 8*d.* per lb. And, in the same year, 363 million yards of cotton fabrics were exported, at a declared value of 12½ millions, averaging 8*d.* per yard, or 5 to the lb. weight, or about 70 millions lbs. for the whole, or 90 including waste, the advance on which, for manufacture, would be about 2*s.* 9*d.* Hence, the mean profits would be under 2*s.* on 110 millions of lbs., or 11 millions sterling on 150 millions lbs. of the import, when exported as thread or woven. The difference between 162 and 150, or 38 millions, would be the quantity chiefly woven for home consumption, or would afford an advance for labour of 2 or 3 millions more, a total gain in labour of 13 or 14 millions in 1829.

It is the chief branch of our manufacturing system, (double that of all the rest of the world,) and the most extraordinary commercial operation ever carried on by any nation.

Cotton, as taken from the pod, is four times heavier than after the seed has been separated, and packing presses reduces its bulk one-third.

Clean cotton wastes full half in fine spinning, and raw silk wastes a fifth in throwing.

Within a century, woven goods were sent to Holland to be bleached, and were returned in six months.

In 1827, there were imported 4,389,582 lbs. of silk; and, in 1829, but 2,899,092. In 1826, the manufactured silks were 400,000*l.*, of which 300,000*l.* were shawls and handkerchiefs; and, in 1829, the same amount; but the shawls, &c. were but 80,000*l.*

Of raw silk 1,136,309 lbs., at 17*s.* 10*d.* per lb. were imported by the East India Company, from Bengal, in 1828.

The raw silk imported, in 1829, was 2,719,962 lbs., and thrown, 172,239 lbs.

The hemp and flax imported was, in 1829, 374,932 cwts., being 150,000 less than the average of the last five years.

The foreign hemp imported in 1828, in value, was 463,240*l.*; and, in 1829, 400,814*l.*

The flax used in England, and much of that used in Ireland, is imported from the Netherlands, Germany, and Russia. The former only answers for fine fabrics. Nearly the whole is spun by machinery, for which there are several very extensive erections at Leeds, and they so far transcend in fineness what can be performed by hand, that great quantities are transmitted from Leeds to the north of Ireland, for the manufacture of Irish linens. It is now common to spin 200 leas to the pound, and even from 200 to 300, each lea being 300 yards. Flemish flax is of a slate colour, German is of a deep brown, Russian is light brown. They are whitened by a bleaching process.

Dunfermline, in Fifeshire, and Barnsley, in Yorkshire, are the two chief seats in Great Britain of linen manufactories. The former has carried every branch to the highest perfection, particularly in damask goods, which are exported all over the world. Barnsley has, for the last 20 years, been its rival; and the two towns, and their vicinity, produce nearly all fabrics of flax, except the linen called Irish, of which considerable quantities are also made at Dunfermline.

The shawls of Cashmere, now so well imitated by the spinning at Bradford, and the looms of Huddersfield, are made in a province between Hindoostan and Thibet. Eastern authors describe it as the happy valley, and a paradise in perpetual spring; and, lying between latitude 33 and 35, it has the finest climate combined with the richest soil. The shawls are made from the wool of the camel, while their sheep also produce fine white silky wool. The whole population is engaged in preparing the thread, and weaving these articles for commerce. They are generally three ells and a half long, and a half broad. The plain shawl, at the loom, is 8 rupees, and by finish raised to 100. They have often been sold in London from 100 to 200 guineas. Their country is considered sacred by the Bramins, who refer to it the terrestrial residence of their gods; nevertheless, the Cashmerians are described as very vicious.

Number of Furnaces for Blasting Iron, in 1828:

	Furnaces.	Tons.
South Wales . .	100	279,512
Staffordshire . .	120	219,492
Shropshire . .	48	81,224
Yorkshire . . .	34	32,968

	Furnaces.	Tons.
Scotland . . .	25	37,700
Derbyshire . .	18	22,360
North Wales . .	19	25,168
Forest of Dean .	2	2,600
Duckinfield . .	1	1,560
	367	702,624

According to the above, in 1828, the produce of 278 furnaces, then in blast, produced upwards of 700,000 tons of pig-iron, and this, exclusive of four furnaces in South Wales, and nine in different parts of England, from which no return had been obtained, so that the total probably amounted to 735,000 tons.

An average of 27 cwt. of pig-iron makes a ton of wrought-iron; while others estimate the average at 30 cwt. to the ton. Admitting the first estimate to be correct, 735,000 tons of pig is equal to 545,000 tons of wrought-iron, out of which, in 1828, there were exported, (except Ireland) 100,265 tons.

Hardwares and cutlery	12,488 —
Estimate of all kinds to Ireland	30,000 —
Ditto of arms, and machinery, and mill-work .	7,247 —
Making a total quantity exported of . . .	150,000 —

Leaving for home consumption the enormous quantity of 395,000 tons, to which may be added about 50,000 tons of old iron, annually brought to re-manufacture, and 12,000 tons of foreign.

Tons weight of all kinds of British Iron and Steel, and of Hardwares and Cutlery, exported in years 1826-7, 8, *and* 9.

Quantity in Tons.

Years.	Iron and Steel.	Bar.	Hardware & Cutlery.
1826	76,358	33,253	9,627
1827	92,282	45,284	12,443
1828	100,264	51,108	12,100
1829	108,063	56,178	13,029

Value at which Exported :—

1821	1,128,723	434,049	1,237,692
1822	1,061,166	356,455	1,334,596
1823	1,073,937	357,959	1,264,444
1824	1,090,856	334,535	1,454,296
1825	1,291,336	450,902	1,656,040
1826	1,105,620	406,515	1,169,105
1827	1,214,938	418,882	1,392,880
1828	1,224,136	325,825	1,385,617
1829	1,160,927	389,425	1,389,516

Proportion of each kind of Iron, exported from 1826-9

Year	Old	Pig	Bars	Bolt & Rod	Hoops
1826	35	6,563	33,253	7,164	7,956
1827	30	7,006	45,284	7,337	8,506
1828	108	7,827	51,108	7,449	8,808
1829	226	8,932	56,178	6,476	9,532

Year	Castings	Wrought	Wire	Nails, &c.	Steel
1826	5,940	3,538	189	11,248	473
1827	6,293	3,957	207	13,037	535
1828	6,205	4,596	311	12,933	917
1829	8,220	4,528	329	12,922	715

There were also exported in each of the years 1826-9.

	Arms and Ammunition.	Machinery and Mill work.
1826	£620,600	£228,505
1827	406,312	201,552
1828	335,513	262,094
1829	279,382	250,062

The blast furnaces of Great Britain are worked by coke of coal, but those of America, Sweden, &c. by wood or charcoal.

Pig-iron sold at 7*l*. 10*s*. per ton in 1812, and at 4*l*. 10*s*. in 1830. Bar iron, at 10*l*. 10*s*. in 1818, and 5*l*. in 1832. Swedish, 16*l*. 10*s*. in 1812, and 13*l*. 2*s*. in 1832.

Produce of the Principal Copper Mines in Cornwall, in July, August, September, and October, 1830 :—

Mines.	Tons of Ore.	Value.
Binner Downs........	1,474	£7,437
Consols Mines	4,714	30,695
Dolcoath...............	3,786	21,570
East Crinnis..........	2,647	12,092
Fowey Consols	2,579	14,192
Great St. George	1,385	10,211
Lanescott	1,626	9,440
Pembroke	1,517	10,643
Penstruthal	1,938	6,219
Poldice	1,208	6,426
Roskear North	1,731	10,990
Ting-Tang	1,040	5,635
Tresavean	1,982	13,818
Wheal Buller	1,046	4,363
—— Jewel	1,722	17,144
—— Leisure	3,439	16,131
—— Towan........	1,261	4,737

The copper ores sold in Cornwall, in three months, in 1830, were 38,800 tons, averaging 102*l*. 4*s*.; and, at Swansea, 4,453 tons, averaging 99*l*. 8*s*.

The BLOCK-TIN coined in Michaelmas quarter, 1830, in Cornwall, was 6,142 tons and 513 grains.

The Mining Companies in 1830.

	Capital.
Anglo-Mexican...............	£1,100,000
Arigna	300,000
Brazilian Imperial	350,000
Brazilian Company	120,000
Ditto Cocaes	280,000
Bolanos	300,000
British Iron	1,000,000
Colombian	467,500
English Mining	71,250
General Mining..............	400,000
Hibernian.....................	500,000
Mexican Company	615,500
Mining Company of Ireland .	500,000
Mocaubas or National Brazil.	150,000
Real del Monte	762,000
St. John del Rey.............	100,000
United Mexican	1,284,040

In 1831, the ardent spirits manufactured were, British, 21,845,408 gallons; and Colonial, 3,624,597 gallons; and the Foreign imported, 1,268,197; being, on the whole, a decrease of 972,000; of which, 899,000 was British.

England consumes 12 millions; Scotland, 5,865 millions; and Ireland, 8.4 million gallons; 3 quarts per individual in England, 8 in Scotland, and 4 in Ireland.

Of British spirits, the quantities made in England were 7¾ millions gallons; in Scotland, 5¾ millions; and, in Ireland, 9,212,223; paying 4,918,780*l.* duty.

Two and-a-half millions of reams of paper are made annually, in Great Britain, by 600 mills.

Half-a-million skins of parchment are manufactured, annually, in Great Britain.

100 millions lbs. of hard soap, and 9 millions of soft soap are made in Great Britain, annually, of which, a 25th is exported, and 50 thousand lbs. of foreign soap imported, at 10*d.* per lb. duty. The net revenue from the whole, at 3*d.* and 1½*d.* per lb., being 1¼ millions, besides the duties on the raw materials, &c. amounting to half as much more. There are about 300 makers.

115 millions of lbs. of tallow-candles are also made, by 2,800 makers, and a 25th exported; and nearly 1 million lbs. of wax candles, beside 160 thousand casks, or above 1 million cwts. of tallow, imported from Russia, &c.

The increased consumption is enormous, the quantities, in 1814, being but 77½ millions lbs. of soap, and of candles but 79 millions.

The whale-oil, produced per annum, was, in 1814, 33,567 tuns, of 252 gallons; but, in 1826-7, was but 25,000 tuns per annum.—Thanks to gas-lights.

Every ton of soap consumes 12 cwt. of tallow, and soap consumes 28,000 tons per annum.

An ox yields 70 lbs. of fat, and a sheep 13 lbs., equal in a year to 90,000 tons over and above the imports from Russia, &c.

Oil for light and other purposes promises to be abundant, from the great increase of the trade with Africa in palm-oils, and with the east in cocoa-nut and other oils, as substitutes for the filthy articles of tallow and whale-oil. The imports in 1814 were but 1,000 tons, and latterly 6,000. This will be the true way to avenge the cause of the Poles, since of the 54,000 tons of tallow imported, nearly 50,000 are from Russia, and the staple of its commerce.

In 1829, there were 660,000 dozen leather gloves made in England, but having been superceded by foreign and cotton gloves, the ancient fabric has been nearly destroyed, and for some years has been unprofitable.

Carpets are made in Great Britain at Axminster, Wilton, Kidderminster, Harbro', Dewsbury, and Kilmarnock.

The bobbin-net, or lace manufactory of Nottingham and vicinity has within 29 years superceded the cushion or loose lace fabrics of Buckinghamshire, Brussels, Mechlin, Cambray, &c. A patent was obtained by Heathcote for a lace-machine, and on his patent expiring, the fabric soon created a ruinous competition, and over-production.

Felkin states that it employs 200,000 persons, and consumes a million of lbs. of cotton thread No. 180 to 220, and 20,000 lbs. of thrown silk, producing 23 millions of square yards of bobbin-net lace, and returning nearly two millions per annum. Much of it is embroidered by hand at very low wages, at home and abroad. It is generally made two yards wide, by hand or power looms, and reckoned by lengths of 240 holes called *racks*, and a square yard weighs 13 drams. There are about 4,500 machines, 1,000 of which are worked by steam, and 3,000 are within 20 miles of Nottingham.

A man, wife, and child point and sharpen 35 lbs. of pins, 5,000 per lb. In a day, at five farthings per lb. Ten persons are employed in wire-drawing, straitening, pointing, twisting, and cutting the heads, fixing the heads, tinning, and papering.

I have known, says Mr. Cooper, coarse wool hats imported from Manchester into Philadelphia, at three shillings sterling each, by the invoice. 1. The land-owner furnished the land that fed the sheep. 2. They are reared by the farmer. 3. They are sheared and washed by those who are accustomed to this operation. 4. The wool is sorted. 5. It is boiled with a little lye, to take out dirt and grease. 6. It is packed up for sale, and sent from the mountains of Wales to Manchester. 7. It is carded at a carding machine. 8. It is bowed by the hat-maker, with a bow made for the purpose. 9. It is crisped by sulphuric acid. 10. It is felted by the journeyman hatter who is occupied in felting, as the former is in bowing. 11. It is sent to the dyer, who uses gall-nuts from Aleppo, logwood from the Bay of Campeachy, sulphate of iron from the coal districts of England, sulphate of copper from Cornwall, or the Isle of Anglesea. 12. It is glued and stiffened. 13. It is steamed and formed on a block. 14. It is banded and lined. 15. A carpenter makes the case in which it is packed. It is then, (16,) shipped to the foreign

port. 17. The merchant importer sells it and packs it off to the inland retailer, who, (18), furnishes it, at about the price of a dollar, to the wearer. It is by this division of labour, and the dexterity thus acquired, that the exporter of woolen hats can obtain a mercantile profit from so low a price.

Eighteen different hands were employed, a few years ago, in making a pin; not one of whom, if left to himself, could make twenty pins a day; by this division of labour, and the tools employed, they can make 5,000 each per day. At present, an engine makes 64 every minute. The effect of labour-saving machines is still greater. The machine for making wool cards, that for making cut nails, and the machine for making screws, are American inventions; whose operation is to increase the product of labour one thousand fold. A piece of iron wire, put into the machine, in a few seconds comes out a screw, perfect in all its parts. A blacksmith could hardly make fifty in a day.—*Cooper.*

The largest plate of glass made by the British Company is 13 f. 4 in. by 6 f. 8 in. and the price when silvered 247*l*. At 11 feet by 7, the price is 200*l*.

The spring of a watch weighs .015 of a grain, and a pound of iron makes 50,000. The pound of steel costs 2*d*. and a single spring 2*d*., so that the 50,000 produces 416*l*.

English manufactures are so diffused that Kotzebue relates that he played on a piano of Clementi and Co. at Tobolsk; and Clapperton, in the interior of Africa, was served on pewter dishes with the London stamp, and he used a wash-hand basin made in Staffordshire.

The ancient staples of England were wool, leather, skins, lead, and tin; and they used to be conveyed to staples or marts, held at Newcastle, York, Lincoln, Norwich, Westminster, Canterbury, Chichester, Winchester, Exeter, and Bristol, where public marts, under the mayors, were kept. Butter, cheese, and cloth were afterwards added. The staple of the wine and corn of the north of France used to be the Greve.

No fair can be held in England without a grant from the crown. Stourbridge and Weyhill are now the chief fairs in England. St. Germans, Lyons, and Rheims, are famous fairs in France; Frankfort, Leipsic, and Nuremburgh, in Germany; Pesth, in Hungary; Zurich, in Switzerland; Nove, in Italy; and Nishi-Novogorod, are the most famous fairs in Europe.

Mr. Kennedy shews, that, since 1812, the price of labour in cotton-spinning has been lowered full 50 per cent.; Marshall says 70 per cent.

The following are the comparative prices of Hardware, manufactured in and near Birmingham, in 1818 *and* 1830, *before and after Peel's Bill.*

Anvils	25*s*. cwt.	13*s*.
Awls	2*s*. 6*d*. gr.	1*s*. 2*d*.
Bed screws . . .	18*s*. gross.	5*s*.
Bolts	6*s*. dozen.	1*s*. 6*d*.
Buttons, coats . .	4*s*. 6*d*. gr.	2*s*. 2*d*.
Buttons, waistcoats	2*s*. gross.	8*d*.
Curry combs . .	2*s*. 9*d*. doz.	11*d*.
Candlesticks . .	2*s*. 11*d*. pr.	1*s*. 2*d*.
Frying-pans . . .	25*s*. cwt.	16*s*.
Hinges	10*d*.	$2\frac{3}{4}$*d*.
Shoe hammers . .	6*s*. 9*d*. doz.	2*s* 9*d*.
Latches for doors .	2*s*. 3*d*. doz.	9*d*.
Locks for doors .	38*s*. doz.	13*s*. 6*d*.
Locks for guns .	6*s*. each.	1*s*. 6*d*.
Plated stirrups . .	4*s*. 6*d*. pr.	1*s*. 1*d*.
Shovel and tongs .	1*s*. pair.	6*d*.
Vices, blacksmiths	30*s*. cwt.	19*s*. 6*d*.
Japanned tea-trays	4*s*. 6*d*. each	1*s*. 5*d*.
Iron wire . . .	16*s*. bundle.	7*s*.
Brass wire . . .	1*s* 10*d*. lb.	9*d*.

This list is published by a Committee, but all other goods, in all lines, are equally depreciated; profits nothing, wages non-subsisting, and thousands embeggared, to *please* the political economists, for there is no other cause whatever.

In the autumnal months of 1829, it appeared that 13,226 individuals, connected with the manufactures of Huddersfield, were reduced to live on $2\frac{1}{2}$*d*. per day; and that $5\frac{1}{2}$*d*. per day was the average pay for a day's labour.

Henry Thornby, weaver, of Croft Grimshaw Park, near Blackburn, has a wife and seven children, the eldest of whom is eleven years of age. We give their last week's work, which is a fair average.

	s.	*d.*
The man wove three pieces of 74 reed, 44 inches wide, 20 yards long, 80 picks or threads in the inch, 1*s*. 9*d*. per piece, (the winding, &c. being performed by the elder children)	5	3
The woman wove $1\frac{1}{2}$ pieces of 74, 33 inches wide, 72 picks in the inch, and 23 yards long, at 1*s*. 9*d*. per piece	2	$7\frac{1}{2}$
The two eldest children wove 2 pieces of super, 33-inch wide, 38 picks in the inch, and 24 yards long, at 1*s*. per piece .	2	0
	9	$10\frac{1}{2}$

Thomas Bond, residing near the foregoing, whose family consisted of ten, mostly grown up sons and daughters, nine of whom are effective workers, average by their united labours, after deducting for incidentals, about 20*s*. per week.—*Manchester Advertiser*, 1829.

Women, generally, are most cruelly

underpaid. They scarcely get, in all manufactories, the wages of a boy of 13 or 14. In farming-work, they get but 4*d.* or 6*d.* per day, and, as assistants in various trades, their best prices are 1*s.* per day; while, in skilful and tasteful occupations, they get but 1*s.* 8*d.* or 2*s.* per week. No slavery can be more unjust and heart-rending.

France has about 2400 miles of canal navigation. England about 2200 miles. The navigable rivers of France are between 4000 and 5000 miles, and of England about 1800. But the coasts of England apply to a country but as 1 to 3.7 of France.

One pound's worth of silk, in silk goods, was worth in France, in 1825, 2*l.* 7*s.*; of wool, 2*l.* 3*s.*; of hemp, 4*l.*; of linen and lace, 5*l.*; of cotton, 2*l.* 3*s.*; of copper and lead, in sheets, 1*l.* 5*s.*; of bar iron, as muskets, 9*l.* 2*s.*; as horse-shoes, 2*l.* 11*s.*; as table-knives, 3*l.* 14*s.*; as bolts, 8*l.* 10*s.*

In 1828-9, France manufactured 220,000 bales of silk, or 50 or 60 millions of lbs. America nearly as much. Great Britain consumed about 600,000 bales, or nearly 280 millions of lbs. China imports 400,000 bales from British India, besides its own growth.

The amount of the French manufactures, exclusive of wines, is about 100 millions sterling per annum; of which woollens, cottons, linen, silk, hardware, and leather, are nearly ten millions each; cotton on the increase.

France manufactures above 8000 tons of fine sugar from beet-root. Sugar is also made for domestic use in the United States, from the sap of the maple.

It is not to be dissembled, that the manufacturing system is anxiously promoted in Prussia, France, Russia, the United States, Switzerland, and the Netherlands; even in Austria and Greece, with our best machinery; and English workmen every where, at very high wages.

Number of Families of Great Britain engaged in, and dependant on each great branch of Production and Occupation, is as follows:—(Marshall.)

MINING DISTRICTS.

Coal district of the North	30,076
Ditto, Gloucester & Somerset	1,966
Ditto, Derby, Nottingham, &c.	2,639
Coal and iron, Warwick and Stafford	54,859
Ditto, Leicester and Salop	6,591
Ditto, Sheffield, Rotheram, &c.	13,997
Ditto, Monmouth and Brecon	9,745
Tin, copper, &c. Cornwall	11,287
Copper, lead, slate, &c. Diverse	6,215
	137,375

MANUFACTURING DISTRICTS.

The Pottery	6,696
Woollen district, W. of England	20,851
Worsted, & mixed stuffs, Norwich, Kendal, &c.	17,570
Woollen, linen, &c. West Riding of York	85,096
Hosiery, Leicester, Nottingham, Derby, &c.	41,918
Silk, Coventry, Congleton, &c.	15,876
Salt Spring District, Cheshire	2,670
Cotton, Lancashire, &c.	163,046
Linen, gloves, silk, &c. West of England	7,566
	361,289

In the mining and hardware districts, the Birmingham, in population, is to the Sheffield as 15 to 4; and the Newcastle coals, to the Cornish copper and tin, nearly as 7 to 6.

In manufacturing, the cotton population is to woollen as 3 to 2; to the hosiery and lace, as 4 to 1; to the silk, as 11 to 1; and to the worsted stuffs, as 11 to 1. The cotton is, in fact, about four ninths of all branches of manufacture.

The Americans calculate that 500 manufacturing families consume as many custom-house goods as 2000 agriculturalists. They also determine that 12 millions of people consume 249 million of dollars of food, 202 million dollars of clothing, &c. &c. in all 1066 million-worth of all produce.

Mr. John Marshall, who has devoted so many years to the examination of the statistics of society, has analysed production and distribution in a sheet, under all its heads. It appears, as a result, that the power of machinery so far exceeds the pressure of taxation, that it would be safer to maintain consumption, by increasing the public debt, than by its diminution to diminish the means of consumption, while annuities, rents of lands, houses, &c. are fixed.

The English male population is $2\frac{2}{3}$ or $7\frac{2}{3}$ millions, then $4\frac{1}{2}$ perform as much labour as 33 millions would perform. And steam-engines, wind and water-mills, &c. &c. are estimated at twice that of men; hence, as much labour is performed in the United Kingdom as could be performed by 99 millions of men; and animals and machinery add 12 times what man could perform alone. In France, Dupin calculates the steam power at only the 15th of that in the United Kingdom, and wind and water at one-fourth. But he estimates their wind and water mills at one-fifth more.

The seeds of the sun-flower yield oil equal to the olive, and the cake is nutricious for poultry or cattle.

Vermicelli is a compound of flour, eggs, &c. made in Italy.

Gold-beaters' skin is the entrails of animals.

Bast, in Asia, is the name of combinations of opium, &c.

English porcelain is made of feldspar, detached from Cornish granite, by trituration and washing; and the silex, ground flint, and soap-stone, from the Lizard.

Trunk-makers' iron is the strips of old tin-kettles.

Black dye of calico-printers is made with the waste iron of old kettles, by pyroligneous acid.

If new milk be evaporated over a slow fire, and the resulting powder is closely bottled, it may be converted into milk again as wanted.—*Dirchoff*.

Certain chemists make it a trade to supply pernicious drugs to brewers, wine and spirit merchants, publicans, grocers, and oilmen.—*Accum*.

Nine-tenths of the drugs used in pharmacy are sophisticated. Peruvian bark is first mixed in Spain, and then by dealers with mahogany saw-dust, oak-wood, &c. Rhubarb, ipecacuanha, James's powders, &c. are also spuriously manufactured. It is the same with hartshorn, magnesia, calomel, &c.

Paterosa, or Tolu lozenzes, are compounded with pipe-clay.

Brandy is made of oil of vitriol, oil of almonds, oil of turpentine, oil of juniper, spirits of wine and lump-sugar, rubbed in a mortar; and then mixed with lime-water, rose-water, sugar, and rain-water.

Confectionery and pastry, pickles and sauces, are subject to the most pernicious adulterations, and often made up of the most poisonous compounds.

Cigars are imitated by cabbage-leaves, soaked in tobacco-water, and cheroots are made of lettuce.

Lead is used by wine-merchants, to stop the ascetic fermentation of wine, and to render muddy white wines transparent. Allum, in large quantities, is used by bakers to bleach bread so as to gratify the fancy of consumers. Beer, by most public brewers, is made of malt, hops, liquorice, treacle, burnt sugar, salt, cocculus indicus, capsicum, poppy-heads, copperas, alum, quassia, tobacco, nux vomica, grains of Paradise, ginger, &c. &c.

Linen, tape, &c. are made up of flax and cotton-thread. Colours for artists and house-painters are adulterated. Soap is mixed with Cornish white clay. Paper is thickened with plaster of Paris, and bleached with oxalic acid. The manufactory of plate and jewellery is a system of frauds.—*Accum*.

It requires 14,000 millions of silk-worms to produce the silk consumed in the United Kingdom annually.

Three pennyworth of gold is said to be sufficient to gild a gross of buttons.

The teeth of a saw-mill may move 8200 feet per minute.

In 1819, bar-iron was 13*l*. to 14*l*.; and in 1832, 6*l*. 5*s*. Pig-iron, 8*l*. to 9*l*. 10*s*.; and, in 1832, 4*l*. 10*s*. to 4*l*. 15*s*. In 1829, Georgia cotton was from 1*s*. 5*d*. to 1*s*. 8*d*.; but, in 1832, but 6*d*. to 7½*d*. In 1819, sugar was 86*s*. to 89*s*.; but, in 1832, 56*s*. to 58*s*. In 1819, Cheshire cheese was 78*s*. to 100*s*.; but, in 1832, 40*s*. to 70*s*.

Paper, for paper-hangings, has been made, at Manchester, of the *flyings*, or waste, of the spinnings and cardings of cotton, by simple hydraulic pressure.

The gin for cleaning cotton was invented in the United States by Whitney, in 1792, and is a master-piece of ingenuity. Till its invention, a woman could separate the seed from only 1 lb. of cotton per day, and by this machine one man can separate 2 or 300 lbs.; owing to which, the American cotton trade has risen to such a magnitude.

Palissey, a French surveyor, in the 15th century, was seized with an ardent desire to discover the Chinese mode of enamelling porcelain. In the pursuit he wasted his substance, burnt his furniture as fuel to his furnace, and even sold his clothes. But he succeeded, and made a large fortune. At 90, however, he died in the Inquisition!

The Woollen returns exhibit great discrepancy. A yard of fine cloth is 18 oz. and waste about 2 oz. Then the imports are 32 millions of pounds, which indicate 25 million yards of fine cloth at 10*s*. or 12½ millions sterling. The 63 million yards returned by the Custom House as exported, are valued at only 4½ millions, or 1*s*. 6*d*. per yard! Besides, at 1¼ lb. per yard, such coarse fabrics would require 95 million lbs. of British wool, for three more than are produced!

In 1830, 259,856,000 lbs. of Cotton were imported, and about 9 millions re-exported. Then taking 24 millions for hosiery, &c. and 76 millions for yarn and twist exported, including waste, we have a nett 150 millions for calicos, muslins, sheeting, &c. Of this 30 millions would be wasted, leaving 120 millions of lbs. of manufactures, which at five yards on the average to the lb. gives 600 millions of yards, of which, if as per returns, 402 are exported, only 198 remain for home consumption, or about nine yards to each of the population.

BREAD AND BEER.

The United Kingdom consumes 12 millions quarters of wheat annually, and 36 millions of other grain. The daily consumption is 144,000 quarters.—*Jacob.*

As about two millions of quarters of various grain are imported on an average of years, so about 46 millions are grown in the United Kingdom.

Eight bushels of wheat is the average annual consumption of able men.

A bushel is 60 lbs.; and, as meal, 58 lbs. Eighty quartern loaves a sack of flour; and a sack of flour is $\frac{1}{5}$ the value of 8 bushels of wheat; and the quartern loaf is $\frac{1}{100}$th of the price of 8 bushels.

In the reign of Edward VI., exportation was prohibited if it exceeded 17*s.* for wheat and 8*s.* 6*d.* for barley. In the reign of Elizabeth, the price was varied to 28*s.* for wheat, and 16*s.* 7*d.* for barley. At the end of her reign, wheat rose to 4*l.* a quarter. In the reign of Charles II. the prices were extended to 40*s.* and 20*s.*; and importation was permitted, with a duty of 6*s.* 8*d.* a quarter, when wheat exceeded 44*s.* In the reign of George II. the annual exportation exceeded a million quarters, and the market-price was 36*s.* 3*d.* per quarter. In 1804, importation was prohibited, unless the price exceeded 63*s.* The prices were—

From 1640 to 1650	£2	19	5
1670 to 1680	2	14	0
1680 to 1690	2	6	11
In 1700	3	8	3
From 1700 to 1710	2	11	10
1710 to 1720	1	17	0
1720 to 1730	1	16	6
1730 to 1740	1	17	6
1740 to 1750	1	3	8

And, in 1750, the exportation at 32*s.* 6*d.* was 1,667,000 quarters.

From 1750 to 1760	2	2	6
1760 to 1770	2	7	7
1770 to 1780	2	5	10
1780 to 1790	2	2	1
1790 to 1800	2	16	0

The average of 50 years, from 1700 to 1750, was 1*l.* 16*s.* 2*d.*; from 1750 to 1800, was 2*l.* 9*s.* 5*d.* In 1800, three millions of quarters were imported more than were exported.

Arthur Young computed the average price of wheat, barley, and oats, for different periods, taking the price, in 1810, as 20*s.*

From 1400 to 1500	3
1500 to 1600	5
1600 to 1700	8.75
1700 to 1800	10.25

Till 1766, a bounty was granted on exportation, 5*s.* on wheat and 2*s.* 6*d.* on barley. But that singular political economist, (Adam Smith) procured the abolition of the bounty, and, for the remainder of the century, less was cultivated, and wheat rose to $11\frac{3}{4}$, latterly to $14\frac{1}{2}$, and, from 1804 to 1810, to 20*s.* The importations and average prices, since 1810, have been as under. Exportation has been out of the question; and the duty on imports has been productive of great additions to the revenue.

From the year 1773 to the year 1814, the total imports of grain were 30,430,189 quarters, and the exports 5,601,440 quarters.

The highest Annual Averages of Wheat, in this century, have been as under—

1800	£5	10	5	1812	£6	2	8
1801	5	15	11	1813	5	6	6
1810	5	3	3				

The lowest Annual Averages of Wheat have been as under—

1803	£2	17	1	1823	£2	11	9
1821	2	14	5	1827	2	15	0
1822	2	3	3				

The grain imported and used in Great Britain, in 1827, was 4.2 millions worth; in 1826, 2.1 millions; and 1825, three millions; and, in 1800, 1810, and 1818, six millions; and, in 1801, $7\frac{1}{2}$.

In the reign of Henry VI. it was not allowed to be exported when it exceeded 35*s.* for wheat, and 16*s.* for barley.

The result of the corn laws will appear from the following statement of the imports of corn in the last 15 years, contrasted with the imports in the preceding 15 years, divided into periods of five years each:—

In the 5 years ending	Quarters.
1805	7,365,184
1810	6,933,975
1815	5,931,693
Total	20,230,852

In the 5 years ending	Quarters.
1820	13,866,973
1825	10,356,958
1830	22,151,525
Total	56,375,456

Importation of WHEAT is permitted, by the law made in July, 1828, on paying a duty of 1*l.* 5*s.* 8*d.* per quarter, whenever the average price of all England is under 62*s.*; from 62*s.* to 63*s.*, 1*l.* 4*s.* 8*d.*; and so gradually reduced to 1*s.*, when the average price is 73*s.* and upwards.

BARLEY is imported at 13*s.* 10*d.* duty, when under 32*s.*; and, when above 41*s.*, at 1*s.*

OATS, when under 24*s.*, at 10*s.* 9*d.*; and, when above 31*s.*, at 1*s.*

CANADA and NOVA SCOTIA WHEAT is admitted at 5*s.* per quarter, when below 67*s.*; and at 6*d.* when above; Barley at 2*s.* 6*d.*, when under 34*s.*; and above, at 6*d.*; Oats at 2*s.*, when under 25*s.*; and when above, at 6*d.*

A barrel of flour of 196 lbs. is, by this law, considered as equivalent to 38½ gallons of wheat; 181½ lbs. of oatmeal is equal to one quarter of oats. Indian corn pays the same duty as barley. When wheat is below 62*s.*, the duty is increased 1*s.* for every shilling of reduction in price.

Baking is an invention by which the meal of grain is, by fermentation and evaporation, brought into the convenient substance of bread. Till the discovery of this art, meal was eaten either as porridge or as biscuits, or oat cakes. The fermenting medium is yeast, in the proportion of a pint to a peck of flour, with three quarts of water, and a quarter of a pound of salt. The peck-loaf weighs 17 lbs. 6 oz., so that a sack of flour yields 20 peck-loaves, or 80 quartern-loaves; the sack itself weighing 2½ cwt.

An oven is deemed at its proper heat when flour thrown into it becomes black, without flame. Four pounds and a half of salt, an ounce of alum, and three pints of yeast, are usually consumed in making a sack of flour into loaves. Loaves are in the oven two and a half hours. Leaven was made by the ancients, instead of yeast, by making some flour into dough, and letting it stand in a warm place 36 hours. This substance, mixed with fresh dough, makes it ferment, as with yeast.

A pound of wheat flour consists—of bran 3 oz., starch 10 oz., gluten three-quarters of an ounce, and sugar one-quarter.

Bakers, in setting the assize, are allowed 12*s.* for their expences, over and above the price of the sack of flour.

Two pounds of wheat make about three of bread.

Wheaten bread, marked with a *W*, is made of the finest flour; standard wheaten is made of the whole flour, mixed; and household, marked *H*, is made of the coarser flour.

The weights, within 48 hours of baking, are as under—

Peck loaf	17 lbs. 6 oz.
Half-peck	8 lbs. 11 oz.
A quarter	4 lbs. 5½ oz.

When put into the oven the dough weighs—

Peck loaf	19 lbs. 12 oz.
Half-peck	9 lbs. 14 oz.
A quarter	4 lbs. 15 oz.

Long-shaped loaves, or bricks, lose more in weight than cubic loaves; and variable loss from baking arises from several causes, equal often to three or four ounces. A sack of flour of 280 lbs. or five bushels, produces 80 quartern-loaves; so that as each loaf weighs 4 lbs. 5½ oz. the produce is 347 lbs. 8 oz., or 67 lbs. gain, so that one-fourth is added in water, salt, and yeast. Good flour absorbs more water than bad, and old flour more than new. Hence, from the first sorts, five or six loaves more are often made from a sack. When alum is used, to indulge the consumers with artificial whiteness, equal quantities of salt and alum are introduced. A quarter of wheat, of eight bushels, yields seven kinds of flour, as under—

	Bushels.	Pecks.
Fine flour . .	5	3
Seconds . .	—	2
Fine middlings	—	1
Coarse . .	—	½
Bran . .	3	0
Twenty-penny	3	0
Pollard . .	2	0
	14	2½

It is found, when economy of wheaten flour is desirable, that one lb. of rice goes as far in satisfying hunger, and in nutriment, as eight lbs. of flour; and that two lbs. of potatoes are equal to one lb. of flour, and equal to four of turnips or carrots. Five lbs. of boiled potatoes, mixed with 20 lbs. of flour, make as good bread as can be eaten. Bran, boiled in the water used for kneading the dough, greatly increases the weight.

The quartern-loaf was, in different years of the past century, as under—

1768 . .	7¼*d.*	1775 . .	7½*d.*
1769 . .	6¾*d.*		

Between 1770 and 1778, Wheat averaged 5*s.* 10½*d.* per bushel; Barley, 3*s.* 1*d.*; Oats, 2*s.* ½*d.*; Beans, 3*s.* 8*d.*

1780 . .	6½*d.*	Wheat, 110*s.*
1781, 2, 3 .	7¼*d.*	1801 22½*d.* to 10½*d.*
1785 . .	7¼*d.*	Wheat, 115*s.* 11*d.*
1786 . .	6¼*d.*	1802 . . 12*d.*
1787 . .	6*d.*	1804 8*d.* to 16½*d.*
1788, 9, & 90	6¾*d.*	1805 16½*d.* to 10¾*d.*
1791, 2, & 4 .	7¼*d.*	1806 11*d.* to 14*d.*
1793 . .	7*d.*	1810 . . 17*d.*
1795 . .	12¼*d.*	Wheat, 103*s.*; and
1796 . .	8½*d.*	105*s.* for 4 yrs.
1797 . .	9¼*d.*	1815 . . 11¾*d.*
1798 . .	8*d.*	1820 21 9*d.* to 12¼*d.*
1799 . .	13*d.*	Wheat, 50*s.* to 65*s.*
1800 . .	21*d.*	

Bread, in the process of baking, emits a vapour, which, being condensed, proves to be a spirit of great strength. A quartern-loaf affords several drachms of pure spirit, of the flavour of *noyou*; and, from the general quantity of baking, it is estimated that 800,000 gallons

per annum might be produced from what has hitherto been lost.

The importation of foreign corn, grain, meal, and flour, in 1830, was three millions and a half sterling. In 1829 it was under 1¾ million sterling; in 1828 under 2 millions sterling; in 1827 about 2 millions sterling; and, in 1826, 1,100,000*l.*

The export trade in foreign corn, &c. in 1830, was 200,000*l.*, greater by 100,000*l.* than in 1828. In 1827, the export was under 42,000*l.*, and, in 1826, 77,000*l.*

The exportation of grain, the growth of the United Kingdom, was, in 1830, under 13,000*l.*, while in the previous year it was about 14,000*l.*; in 1828, about 28,000*l.*; and, in 1827, nearly 20,000*l.*

The arrivals of foreign wheat, in 1830, in the Port of London, were 656,000 quarters; in the previous year they were about 580,000 quarters; in 1828, about 440,000; and, in 1827, 54,000 quarters. Foreign barley, 38,000 quarters, and, in 1829, 121,000 quarters. Foreign oats, 230,000 quarters; and, in 1829, 340,000 quarters. Foreign flour, about 92,800 barrels; and, in 1829, 47,000 barrels.

The total quantity of wheat which entered the Port of London, from various ports of England, Scotland, and Ireland, and abroad, in 1830, was 878,000 quarters, while, in 1829, there arrived 1,040,800 quarters; and, in 1828, 491,000 quarters. Of barley, 338,000 quarters; in 1829, 356,000 quarters; and, in 1828, 384,300 quarters. Of oats, the whole arrivals, in 1830, were 902,000 quarters; in 1829, 1,146,000 quarters; and, in 1828, 1,444,000 quarters. Of flour, the whole arrivals, in 1830, were nearly 93,000 barrels and 413,000 sacks; and, in 1829, 369,000 sacks, and 77,000 barrels.

The highest average price of wheat, in 1831, was in the month of August, when it was at 72*s.* 8*d.*; the lowest average was in February, when it was at 56*s.* 2*d.* per quarter.

The average prices of wheat, for five years, has been 62*s.* 1*d.*; of barley, 35*s.* 3*d.*; of oats, 25*s.*; of rye, 38*s.* 3*d.*; of beans, 41*s.* 11*d.*; and, of peas, 43*s.* 6*d.*

There were 36,794,206 bushels of malt consumed in 1828, and 29,153,677 in 1829, of which, 4,210,880 and 4,086,140 were by distillers.

In 1829, there were imported 2,562,051 quarters of corn, and 462,254 cwts. of meal and flour. Also, from Ireland, 2,307,817 quarters of grain. The duties were 837,078*l.* The whole equalled the produce of two millions of acres of land.

Barley, in rainy years, degenerates into oats; and oats, in dry seasons, change into barley. These facts, related by Pliny, Galen, and Mathiola, have been confirmed by the experiments of naturalists.—*St. Pierre.*

One peck of seed wheat produces an average crop of two bushels, but by separating and transplanting the roots of a single grain of wheat 500,000 grs. have been produced. France, Poland, &c. produce 5 or 6 to 1, and fertile parts of France 15 to 1. In South America, from 12 to 24 to 1.

Two bushels of seed in England produce 18 of wheat, 4 of barley, and of potatoes, 190 bushels in fair crops.

The quantity of seed used in dibbling is from 1½ to 2 bushels per acre; by broad cast it is 2½ bushels per acre.

Wheat and barley grow more in the day than night, and more rapidly from eight in the morning till two o'clock.

1000 parts of wheat yield 740 parts of starch, barley 790, rye and oats 640, peas 500, beans 420, potatoes 160 to 200, beet, parsnips, carrots, turnips, &c. under 75; grasses from 65 to 20. Wheat, rye, and beans, most gluten. Beet, parsnips, carrots, barley, and turnips, most sugar. Wheat and barley most soluble matter.

The United Kingdom is estimated to consume a million of quarters of various grain per week, of which about 250,000 quarters is wheat, or 13 millions per annum.

Wheat, in America, averages 36*s.* per quarter. 40*s.* is the highest.

In 80 quartern-loaves, the produce of a sack of 280 lbs. of flour, one-fifth consists of water and salt. But as good and old flour absorbs more water than new and bad, it often makes 85 or 86 loaves to the sack.

Every member of the population is considered as consuming the flour of a quartern of wheat per annum. But of the flour of other grain about two quarters.

Wheat, in 150 years, averaged, in 1668 and 1706, 25*s.* 1½*d.*; in 1732, 22*s.* 8¼*d.*; in 1743 and 4, 22*s.* 0¾*d*; in 1761, 26*s.* 9¼*d.*; in 1779 and 1786, 23*s.* 10*d.*

But the war against the liberties of France raised it, in 1795, to 72*s.* 11*d.*, double its price for 125 years; in 1796 to 76*s.* 3*d.*; in 1800 to 110*s.* 5*d.*; in 1801 to 115*s.* 11*d.*; in 1812 to 122*s.* 8*d.*; and 1813 to 106*s.* 6*d.*

Its highest price, before the war of 1793, was, in 1674, 61*s.*; in 1693, 60*s.* 1¾*d.*; 1698, 60*s.* 8¾*d.*; 1709 and 1710, 69*s.* 6*d.*

The average of the last 20 years has been about 70*s.*, nearly double its price in the 20 years before 1793.

Down to 1702 the quartern-loaf was called the sixpenny-loaf, and varied, between 1758 and 1792, from 4½*d.* to 8½*d.*,

but, after the wicked and unwise wars against France, it rose from $8\frac{1}{2}d.$ to 13, 15, 18, 20, and even, in 1801, to $22d.$ The corn-laws keep it at $8\frac{1}{2}d.$ and $9\frac{1}{2}d.$, and there being 30,000,000 per week consomed, the tax costs the people 90,000,000 pence per week, or above 17 millions per annum.

Nearly three million quarters of MALT are consumed in Great Britain per annum. From $1\frac{1}{4}$ to $1\frac{1}{2}$ million barrels of porter and ale are brewed by the Loodon brewers only.

According to a parliamentary return, in 1831, there were 5,419 brewers in England, 182 in Scotland, and 207 in Ireland—Total, 5808. There were 47,893 licensed victuallers in England, and 16,750 in Scotland. There were, in England, 20,291 persons licensed for the general sale of beer, (in addition to the 48,000 publicans!) besides 23,582 victuallers who brew their own beer, aod 11,432 persons licensed for the general sale, who brew their own beer, making 130,000 licensed manufacturers and vendors of beer.

In 1830, the strong beer was 5,949,294 barrels in England; and, in Scotland, 110,953. 78,000 barrels were exported.

There were 1,077,285 barrels of porter brewed in London, from July 5, 1829, to July 5, 1830; being less than for several of the previous 24 years, in which period the consumption of gin has risen from 12 to 24 millions of gallons. Five brewed above 100,000 barrels; and Barclay, 262,306.

The London Porter brewers, in 1828-9, produced 135 gallons from one quarter of malt, which, with duties and expenses, cost 8*l*. 8*s*., or nearly 1*s*. 3*d*. per gallon; the retailing, at 5*d*. per pot, leaving a profit of 5*d*. to brewer and publican. The duties on the beer were 1*l*. 14*s*. $4\frac{1}{2}d.$; on the malt, 20*s*.; and, on the hops, 1*s*. $7\frac{1}{2}d.$; adding 5*d*. on every gallon. Without duties, the cost price would be 10*d*.; or, at lower costs of malt and brewing, 8*d*.; and, therefore, susceptible of being retailed at 10*d*. per gallon. It is now 14*d*.

The specific gravity of ale is about 1.04; of brown stout, 1.01; and, of porter, is 1,014.

Between 1720 and 1730, 500,000 qoarters more of malt were consumed in brewing 3,733,000 barrels of beer, than from 1790 to 1800, in brewing 6,170,000 barrels. A proof of the excessive adulteration by drugs.

In 1826, the brewers, from $23\frac{1}{2}$ millions of bushels of malt, made seven millions of strong beer, and two millions of table-beer, which is but $2\frac{1}{2}$ bushels to the barrel.

Malt dried, at 119° is white, at 134° amber, and 148° brown. It loses from 8 to 10 per cent. in weight; but, in bulk, it increases from 7 to 10 per cent. One-half the starch of the malt remains in the grains, for 100 lbs. of grains re-malted weighs from 52 to 56 lbs. Malting germinates the grain, and the germination is stopt before the plant shoots; but the process converts the kernel into starch soluble in water. In brewing, the water is 180° for the first mash, and 190° for the second. In cooling, from 200° to 52°; worts lose about a fourth. Io 151 parts of yeast, 136 are water, 3 saccharine matter, $2\frac{1}{2}$ alcohol, $2\frac{1}{2}$ mucilage, and 5 gluten, with some lime, potash, and acids.

Four or five bushels of malt, and 4 lbs. of hops, are usually employed in making a barrel of good family ale.

In grinding malt, stones will crush twelve quarters per hour; iron rollers as much; and large steel mills, six or eight quarters. Beer, from pale malt, is made into the porter-colour by infusing burnt sugar, mixed with water.

There are about 50,000 acres of hop plantations in England, which cost, in coltivation, poles, bags, &c. 30*l*. per acre. The produce, in 1829, was about 30,000 bags.

The Hop Doties of 1829 were 69,333*l*.; of which Rochester paid 39,136*l*.; Canterbury, 15,060*l*.; Sussex, 9,969*l*.; Hereford, 1,701*l*.; Salisbury, 1,062*l*.; Hampshire, 917*l*.; Worcester, 379*l*.; and Essex, 202*l*.

Kent produces more than half the hops grown; Sussex, one-foorth; and Hereford, Worcester, &c. the other one-fourth.

Bread and beer are the staple of the British people, aod never were staples so abused by adulterations and combinations for their support. Pore bread is seldom to be publicly bought, and as to beer, it has neither the colour nor flavour of ale or beer brewed by families from malt and hops, for their own ose!

In the last eight years, not quite two millions of quarters of grain have been imported per annum, one of which has been wheat. Hence, if the whole consumption is 48 millions, the United Kingdom produces 46 millions, and it may be questioned whether the two millions of imports are otber than mere speculations of dealers.

Manufacturers of goods forget that, compared with grazing, grain is a manufacture, which employs a man, for every 60 quarters, more than grazing, or 16,600 men for every million quarters.

The price of corn is in exact relation to the price of meat, and the profits of both are fixed by oatore. The preference in cultivation is, whether, at market prices, 226 lbs. of mutton, 187 of beef, or 3 or 4 quarters of grain yield most.

NAVIGATION, SHIPPING, AND NAVY.

The first merchants were camel-drivers, acting as interchangers. The next were the Phœnicians, who availed themselves of navigation. In general, trading is only advantageous when demand and want precede supply and production, or when the latter are governed by the wants of the importers. Competition and political circumstances have generally destroyed a trading ascendancy every 200 or 300 years; it is, therefore, a factitious and precarious source of public wealth.

The earliest recorded traders were the Phœnicians, who were succeeded by the Carthaginians, Venice, Genna, and the Hans Towns; Holland and Portugal followed; but for 100 years Britain has obtained the ascendancy, and the United States are rapidly advancing. Commerce and feudality seem to be incompatible.

The Carthaginians were colonists from Phœnicia. Under the Roman government, all industry succombed to the lust of conquest and military ascendancy. Navigation was natural to the Venetians, and they absorbed the commerce of the world from the year 1000 to 16 or 1700, having for rivals the Genoese and the Hanseatic league, in which Lubeck, Bremen, and Amsterdam took the lead; and Bruges, Antwerp, Dantzic, and Hamburgh concurred. The Dutch republic, civil liberty, and the spirit of discovery for two centuries, transferred the trade of the world to the Dutch, but in the middle of the 18th century the tonnage of England increased to half a million.

In the 15th century, the Argosers and Galeasses of Venice, from 100 to 300 tons to the number of 3000, connected the commerce of Asia and all Europe. Her exports were 10 millinns of ducats, at 9*s*. 3*d*., and her profits four millions. But foreign policy and bad government destroyed her.

The stat. 3d Rich. III. were the first rudiments of the Navigation Laws; it gave a preference in imports and exports to British shipping. Some modifications took place in subsequent reigns, particularly in that of Hen. VII. But the most important Navigation Act was one of the Commonwealth, in 1650, and after. They were continued after the Restoration by the statute 12th Car. II. cap. 18, which enacted, that no goods should be borne to or from the British plantations and territories, except in ships of British or American building.

This policy was reinforced by Jenkinson, Act 36, Geo. III. to encourage British ship-building. It was maintained as law for 170 years, but constantly departed from in practice.

At length the legislature tolerated what is called a liberal system of intercourse between the colonies and other parts of the world reciprocally, by statutes 3d Geo. IV. cap. 42, 43, 45, by which, neutral ships may trade as well as British.

By the new Navigatinn Act, 6th Geo. IV. the *coasting trade*, the traffic of the islands of the British Seas, and exportation from Great Britain to the British possessions in Asia, Africa, and America, and the carrying trade between these places, is confined to ships British built.

By the Act 7th Geo. IV. cap. 48, *importation of foreign goods* is prohibited, except goods the produce of places in Asia or Africa, in or brought to a place within the Straits of Gibraltar; and except of bullion and precious stones, and in cases of reprisal goods; but the produce of the dominions of the Grand Seignior are importable from his dominions in Europe, in shipping of his dominions.

British vessels, and those of the places of import and of prnduce, may convey timber, tar, salt, tallow, hemp, grain, sugar, vinegar, brandy, and tobacco.

Prohibited goods may be brought here for exportation in any ships; but if from a British possession, the privilege is confined to British bottoms.

The Statute of 9th and 10th Will. III., cap. 44, secured the monopoly of the East India Trade. By 33d Geo. III., cap. 52, any other British subjects were allnwed to export from the United Kingdom to all places except China.

British and colonial-built vessels and prizes must be duly registered at the ports to which they belong. Copies of register are annually sent to the Custom-house, London. The master and three-fourths of the crew must be British subjects. The property in every ship is divided into 64 parts; but 32 persnns only may at one time be owners of it. The majority of owners appoint the master or captain. The power of this officer over the crew is great, and, in cases of emergency, he may exact the services of the passengers. He has, however, no judicial authority, but is responsible for all his actions.

On approaching the British shore, a vessel comes within the range of the pilotage system. By the Act 6th Geo. IV. cap. 126, pilots are appointed by the Trinity Houses of Loudon, Hull, Newcastle, and Deptford.

On the accession of George III. the British tonnage was 540,241.

1770	896,495
1780	731,286

1790	1,424,012
1800	1,445,271
1810	1,624,120
1820	2,508,100
1830	2,517,000

The foreign ships which cleared out were, in tons,

1760	107,237
1770	63,176
1780	154,111
1790	148,919
1800	685,051
1810	1,138,527
1830	710,300

Total vessels registered, U. K., and Col.

1826	24,625
1827	23,199
1828	24,095
1830	23,453

1820	Tons 2,508,191	Men 155,576
1830	Ditto 2,517,000	Do. 155,000

ENTERED INWARDS:

	British & Irish.	*Foreign.*
1826	12,473	5729
1827	13,133	6046
1828	13,436	4955
1830	18,877	5359

CLEARED OUTWARDS:

1826	10,844	5410
1827	11,481	5714
1828	12,248	4405

New vessels registered in the three following years:—

1826	1719
1827	1440
1828	1185

In 1814, the British ships entered inwards were 8975; in 1821, 11,056; and, in 1827, 8, and 9, the average was 13,409; and, in 1830, 18,877; but this last included about 60 steam-vessels, which perform each 60 or 80 voyages per annum.

The foreign ships entered inwards were, in 1816, 3974; and 1830, 5359.

London owns 2663 ships; Newcastle, 967; Liverpool, 805; Sunderland, 624; Whitehaven, 496; Hull, 579; Bristol, 316; Yarmouth, 579; Plymouth, 302; Dartmouth, 349; Beaumaris, 389; Cardigan, 281; Gloucester, 247; Rochester, 255; Faversham, 217; Colchester, 235; Greenock, 371; Glasgow, 235; Aberdeen, 350; Dundee, 299; Leith, 263; Grangemouth, 204; Belfast, 247; Dublin, 289; Cork, 256; Jersey, 200; and Man, 217; with other ports; in all, 19,110, and 2,199,959 tons; seamen, 134,516. Colonial shipping, 4343, and 317,041 tons.

The colliers to London, in 1832, were 7437.

There were 241 steam-vessels in 1829, in England, of 20,611 tons; 75 in Scotland, of 5958 tons; and 26 in Ireland, of 4791 tons, since increased to 400.

The coasting trade of the United Kingdom, including colliers, employs about 3000 vessels, of which 1200 are colliers.

The number of coasting vessels, which arrive in the port of London annually, is about 19,000, or three times the number at the beginning of the last century.

The ships of the East India Company which cleared from Canton, in 1828, were 29,556 tons.

The docks at Liverpool yielded, in 1829, 161,876*l.*, or 6400 more than in 1828. The vessels of all kinds were 10,703 and 11,383, averaging 130 tons.

The dock-dues of Liverpool to June 24, 1831, were 200,173*l.*; and to June 24, 1832, were but 186,415*l.* 12,928 vessels entered, of 1.540,547 tons, being a decrease of 52,370 tons.

Bamborough Castle, built by Ida, King of Northumberland, is still kept up as a valuable establishment for the assistance of wrecks on the coast, with signal-guns, life-boats, beds, &c. &c.; founded by Crowe, Bishop of Durham, in 1720.

On the Manchester and Liverpool railway, the journey is, on the average, performed in a train, in about 90 or 100 minutes. The train consists of 20 waggons, or upwards, weighing about 4½ tons each; and the consumption of coke is about 1000 lbs., or 33 lbs. per mile, making the third of a pound, or about 5 oz. per ton per mile. The cost of an engine is about 800*l.*; and of one connected with a coach for 12 passengers, about 1200*l.* A loco-motive engine appears to perform the work of 1500 mail-coaches, or 1500 waggon-horses per day. 800 passengers have been drawn from Manchester to Liverpool in little more than an hour, by the train of one engine. The whole concern had cost a million in January, 1832, and the receipts of the year were 155,500*l.*, of which 112,000*l.* was for passengers. The goods conveyed were 88,000 tons, besides coals. The dividends to the shareholders have been 4½ per cent. and the 100*l.* share sells at 200*l.*

The ships, tonnage, and men of the United Kingdom, and the Colonies, were, on December 31, 1829, 30, and 31, as under:

ships.	*tons.*	*men.*
23,453	2,517,000	154,808
23,721	2,531,819	154,812
24,242	2,561,964	158,422

In 1832, the British ships entered *inwards* were 14,488 of 2,367,322 tons; the foreign, 6085 of 874,605 tons. The ships cleared *outwards* were, British and Irish, 13,791, tonnage 2,300,731; and foreign, 5927, tonnage 896,051.

The new vessels in 1830, 31, and 32, were 1150, 1117, and 1003.

The American tonnage has closely approached that of the United Kingdom

for 2 or 3 years; and the former is rapidly increasing, while the latter is, at best, stationary.

	Tons.
The registered tonnage of the United States, in 1829, employed in foreign trade . .	850,431
In the coasting-trade, paying duty on each	748,750
Fishing vessels	131,099
Tonnage owned by citizens of the United States engaged in the foreign trade	1,752
Total on which duties were collected . .	1,732,034

In 1830, it was 1,850,000; in 1831, 1,964,000; and, in 1832, above 2,000,000.

In 1831, 1634 ships in foreign trade arrived at New York, and 766 at Boston.

In 1829, the tonnage which entered the port of London was 999,678; and, in 1830, but 930,000. In 1832, the arrivals from foreign parts were 3190 British, 882 foreign; making 778,071 tons; but the coasters, colliers, &c. made nearly 18,000 more.

The British Chinese trade employs 20,000 tons of shipping from home, and 20,000 from India.

500 vessels per quarter entered and cleared, in the Port of Goole, in 1829.

192 ships, of 80,537 tons, sailed in 1828, on the extra trade to India; and 36,000 tons by the Company. In 1828, the teas imported were 33,000,000 lbs.

A timber ship, the Renfrew, was launched at Quebec, in 1825, of 5888 tons; 309 feet long, 80 broad, and 38 feet deep internally, nearly a furlong round.

A ship of 2000 tons carries 500 tons ballast; 1000 tons, 230 tons; 500 tons, 130 tons.

In 20 years, 1811 to 1831, 348 steamboats were built on the Mississippi, of which 14 were burnt, 3 by collision, 34 by various accidents.

The London Companies for docks are, the Commercial, the East India, the Surrey-canal, the London, the St. Katherine's, and the West India.

The following is the capital, in 100*l.* shares, engaged in the London docks:

St. Katherine's . .	2,527,732*l.*
London	3,114,000*l.*
West India . . .	1,380,000*l.*
East India	483,750*l.*
Commercial . . .	3665 shares
East Country . . .	1038 shares

Extensive docks are now preparing at Bristol, on which 300,000*l.* have been expended; and Gloucester has the benefit of a ship canal and docks, creating a great increase of trade.

The 22 docks of Liverpool cover 111 acres, and the quay spaces around them are 8 miles, and beside the river, 2½ miles. The Prince's dock is 57,129 square yards; the Queen's, 51,502; the King's, 37,776; Brunswick, 60,824.

The cost of the 22 docks and dry basins has been above two millions. The first, erected in the reign of Anne, is now filled up. 12,000 vessels enter, inwards and outwards, per annum.

On the east coast, there are 9 Trinity-house lighthouses and 5 floating lights; in the channel, 12 lighthouses and 2 floating lights; 7 lighthouses in the Bristol and St. George's channel. There are also other lighthouses, public and private establishments.

Marine insurance began in the 15th century.—Marine insurance, to India, is 3 per cent.; in Europe, from 7*s.* 6*d.* to 15*s.*; to North America, 1 per cent.; and to South America, from 2 to 2½.

Sea policy stamps were, in 1815, 370,956; and, in 1829, but 230,236*l.*

By *Lloyd's List* it appeared, that, in 1829, about 677 British ships were totally lost, under various circumstances; and, if the number of voyages were equal in the 24,000 ships, this gives 1 to 38 as the ratio of danger at sea. 400 others were put in hazard.

The wreckers of Cornwall are the inhabitants of a few parishes, on the rocky coast, between Mount's Bay and the Lizard. When a wreck takes place, thousands assemble with axes, hatchets, crow-bars, &c.; and many women and children fight, by habit, for the plunder, utterly regardless of the sufferers.

The "Falmouth Packet" List includes 6 to Lisbon, whose mean absence is 28 days; 4 Mediterranean, 7 weeks; 6 Madeira and Brazil, 20 weeks; 7 Buenos Ayres, 24 weeks; 3 Leeward Islands, 12 weeks; 6 Mexico, Jamaica, and Hayti, 18 weeks; 4 Jamaica and Carthagenia, 16 weeks; and 5 Halifax, Bermuda, and North America, 13 weeks.

To prevent confusion in sailing, vessels to starboard keep their course; and those to larboard are bound to tack.

Ships, from places infected with plague or yellow fever, perform 40 days quarantine.

A steam-packet has passed from Dover to Calais, and back, in one tide.

The cruelties practised on whales by the fishery are so enormous, that no benevolent person ought to consume whale-oil.

The cod-fishery employs 300 vessels. A barbarous seal-fishery has also been commenced, and 100,000 of these harmless and intelligent creatures are annually destroyed by insatiable avarice.

Henry VIII. established the dock-yard at Woolwich, and a separate Royal Navy. Besides the *Great Harry*, he had the *Regent* of 1000 tons, and 650 men, and the *Henry Grace de Dieu*, with 3 tiers of guns, 4 masts, and very lofty poops and forecastles. Elizabeth's largest ship was the *Triumph* of 1000

tons, 60 guns, and 780 men. King James built the *Prince*, of 1400 tons: and Charles I. the *Sovereign of the Seas*, of 1600 tons. First-rates are now 2500 and 2600 tons. The Caledonia, of 120 guns, and 2616 tons, is 205 feet long, 53 broad, and 23 feet in the hold. The French Commerce de Marseilles was 208 feet long, and 2747 tons.

An improved 50-gun ship, 32 pounders, is 2000 tons, 183 feet long, 176 feet high from keel to deck, and 52 feet broad.

In January, 1833, the British Royal Navy consists of 574 vessels of all sizes and conditions, including 25 building, with cutters, tenders, lazarretos, sheer-hulks, &c. Of these, 127 are of the line, 8 building, and 36 useless; leaving 83 fit for service. There are besides, 97 ships of from 58 to 46 guns, of which, about 70 are fit for service.

13 of the line are in commission, 9 of 50 guns, 26 frigates, 35 sloops, and 91 brigs, cutters, &c.

23 are first-rates, or 120 guns; and about 16 in serviceable state.

There are 172 admirals, besides 33 on half-pay; about 800 captains, 1000 commanders, and 2850 lieutenants.

There are 100 companies of marines; 26 at Chatham, 29 Portsmouth, 27 Plymouth, and 18 Woolwich; with about 1000 officers.

The United Kingdom has 83 ships of the line; France, 43; the United States, 12; Russia, 28; Sweden, 6; Denmark, 4; Holland, 9; Spain, 8; Portugal, 3; Mexico, 2; Columbia, 2; Brazil, 1; Turkey, 10; and Egypt, 2: besides frigates, sloops, &c. &c.

The American Navy, in 1831, consisted of 12 ships of the line, and 17 frigates, besides smaller vessels.

Second-rate ships are from 80 to 100 guns on two decks, with a complement of 700 men; third-rates have 74 guns, and 650 men; fourth-rates 50 or 60 guns, and 400 men.

The above are called ships of the line.

The fifth and sixth rates are frigates, from 24 to 48 guns.

Our best ships are built after French models, the French being the most scientific ship-builders.

In the time of Henry VIII. the royal navy consisted of 1 ship of 1500 tons, 2 of 800 tons, 3 of 600 tons, 3 of 400 tons, and 6 or 7 smaller. The largest was called the Great Harry. At his death, the royal navy was extended to 50 ships, making 12,000 tons, manned by 8000 sailors and soldiers. Elizabeth's fleet, in 1588, consisted of 176 ships, with 15,000 men, 40 of which were of the royal navy, and 2 of a thousand tons. The Prince Royal, built in 1610, was 1400 tons, and had 64 guns. In 1637, the Sovereign of the Seas was launched, of 1637 tons, and pierced for 86 guns. In 1679, the navy consisted of 76 ships of the line; and, at the revolution, 173 ships of all sizes. At the death of George II. it consisted of 412 ships, measuring 321,000 tons. In the last war, there was in commission from 100 to 106 ships of the line, from 130 to 160 frigates, and 200 sloops of war; besides smaller vessels amounting to another 500, and measuring between 800,000 and 900,000 tons.

Greenwich Hospital has a governor and lieutenant, also 5 captains, and 8 lieutenants, with about 60 clerks, medical assistants, &c. It has estates in the three northern counties, and valuable schools, with 10 masters and mistresses.

An admiral carries his flag on the main-top-mast, a vice-admiral on the fore-top-mast, and a rear-admiral on the mizen-top.

The Naval Asylum, at Greenwich, educates 1000 children of non-commissioned officers, seamen, and marines.

The wages of seamen in the royal navy are 2*l.* 12*s.* per month, and 1*l.* 12*s.* is allowed for their provisions.

The navy estimates, for 1830, were 5,595,855*l.*

There are 7 royal dock-yards in England and Wales, and 9 in different colonies, with from 4 to 5 or 6 officers and clerks.

There are 5 naval stations, or commands, in the United Kingdom, and 7 in the colonies.

The naval signals, by telegraph, enable 400 previously-concerted sentences to be transmitted from ship to ship by varying the combinations of two revolving crosses; and also to spell any particular words, letter by letter.

A lieutenant in the navy ranks as a captain in the army; a post-captain as colonel; and an admiral as general.

Below the lieutenants are warrant-officers, as master, second master, boatswain, and carpenter; also chaplain, surgeon, mate, and purser. The petty officers are masters' mates and midshipmen.

Promotions of midshipmen cannot take place under six years; of lieutenants, under two years; nor of commanders, under one year. Captains become admirals by seniority. All warrant-officers must have served as mates.

The master has charge of all the ship's materiel. The gunner of the ordnance, &c. The boatswain superintends the stores, &c. The carpenter watches the soundness of every part. The purser manages the provisions.

The annual demand of timber for the

royal navy, in war, is 60,000 loads, or 40,000 full-grown trees, a ton each, of which, 35 will stand on an acre. In peace 32,000 tons, or 48,000 loads. A 74-gun ship consumes 3000 loads, or 2000 tons or trees, the produce of 57 acres in a century. Hence, the whole navy consumes 102,600 acres, and 1026 per annum.—*Allnut.*

But, as five oak-trees yield a load and a half, so the navy may demand half a million of acres, or the produce of 5000 per annum. Teak is, however, preferred to oak, as more durable and less liable to splinter; and ships-of-war of this timber are building both at Bombay and Port Jackson!

Larch is recommended. At 70 years it is full-grown; and a tree of 79 years was 102 feet high, and 12 feet girth, with 253 cubic feet. Another, of 80 years, was 90 feet and 17 feet, and 300 cubic feet, or 6 loads.

Pensions for wounds and widows are provided by stopping 3*d*. in the pound from all payments to officers, and by rating every 100 men as 101. This yields to widows from 120*l*. to 5*l*. per annum; and, for wounds, from 20*l*. to 4*l*. Both eyes being reckoned at 20*l*. a year, one eye at 6*l*., an arm from 20*l*. to 14*l*., and a leg from 14*l*. to 12*l*.

The chest, at Chatham, by which Greenwich Hospital is supported, arises from the stoppage of 6*d*. a month from the wages of warrant-officers and seamen, and 2 per cent. on prizes. Also 6*d*. a month from the wages of all mariners, the duties on certain light-houses, the Derwent-water estates, the Market at Greenwich, unclaimed prize-money, and various grants and bequests, which make a capital and annual interest. The Derwent-water Estates yield above 60,000*l*. per annum. The mercantile sixpences, 20,000*l*.; and the naval seamen's 6*d*. from 8 to 15,000*l*.; and the light-houses, 67,000*l*.; making, with interest, about 150,000*l*. per annum. The out-pensioners are from 20 to 30,000. The hospital provides for 3000, besides 200 widows as nurses.

A Portuguese once passed from Cochin to Lisbon in a boat 22 palmos (9 inches each) long, 12 broad, and 4½ deep. A Buccaneer once passed from the Coast of Mexico to Manilla, by himself, in an open boat.—*Dampier.*

The voyage from New Orleans to Louisville is now performed in ten or twelve days, formerly three months.

Egyptian drawings prove that the ancients knew the use of the anchor and capstan, the pulley, and the vice.

In 1829, a 74-gun ship was put on the stocks at Van Dieman's Land, to be built of teak-wood, and sheathed with India rubber.

There is a seaman's hospital ship, lying off Greenwich, in which, in eight years, 12,000 seamen were relieved, or cured, at an annual expense of 4,300*l*.

Foreign seamen, after two years' service in any British ships, are naturalized.

Persons enlisting as soldiers or sailors are not to be sworn in before a magistrate in less than 24 hours, and then are at liberty to dissent, on returning the enlisting or bounty-money, and 20*s*. costs.

None can be pressed into the king's naval service above 55, nor under 18. No apprentices, nor landsmen who have not served at sea for 3 or 2 years. No masters of merchant-ships, first mates of 50 tons, and boatswains and carpenters of 100 tons. No men employed by the public boards, and none, except by an officer, with a press-warrant. The system is an exception to the rule of social right. The public want the services of persons subject to impress, and yet decline to pay such bounties and wages as should tempt men to become volunteers. If bounties and wages in the king's service were equal to those in the merchant's service, the royal navy would be manned with volunteers, and half the irksome discipline of the navy would be unnecessary.

During the late war, the number of seamen and marines was 150,000. The sums voted for the navy were 18 millions; and the waste was enormous.

Scurvy is arrested totally by the citric acid; and the deaths in the last war were, to those in the American war, only as 1 to 4.

Noah's Ark, taking the cubit at 22 inches, was 547 English feet long, 91 broad, and 54 high, measuring, according to Bishop Wilkins, 72,625 tons, or 20 times as much as the Caledonia.

The Cinque or Five Ports of Dover, Sandwich, Romney, Winchelsea, and Rye, as the nearest points to France, were anciently considered as the keys of the kingdom, and therefore put under a Lord Warden.

Indians supply themselves with tolerable water at sea, by diving to depths where it is less salt, and there filling a cocoa-nut.

Good water may always be procured on the sea-coast, by digging wells within high-water mark, and waiting the return of the tide.

The greatest depth of a plumb-line has been 7200 feet, 1⅓ mile.

The dip of the needle at London is now about 70°. In 1821, it was 70°.03; and, in 1824, it was 70° 10/ 5″. It indicates an annual decrease of about 3

minutes, and from 3 to 5 hundredths. In 1720, Whiston made it 75° 10'. The French make the difference an increasing series. At Paris, in 1832, it was 67°.41; at Berlin, 68°.16; at Stockholm, 71°.40'; and at Bruxelles, 69°.40'.

The variation is nearly 24° at London. In 1818, it was 24°.30'. In 1657, it was 0.

The several London Docks occupy, in water, wharfs, warehouses, &c. 295 acres.

The British ports provided with docks are Liverpool, London, Bristol, Hull, Goole, and Leith.

In 1831, the ships entered at the following ports were,

Amsterdam	2,132
Antwerp	955
Barcelona	2,720
Batavia	960
Bordeaux, about	400
Boston	550
Bremen	881
Cadiz, about	700
Calcutta	686
Canton, about	900
Cape of Good Hope, about	200
Charles Town, about	200
Dantzic	1,050
Hamburgh	1,584
Havannah	1,053
Havre	1,074
Leghorn, about	450
Lisbon, about	300
London, about	22,000
Liverpool	10,703
Marseilles	2,048
Memel	809
New York, about	6,000
Odessa	700
Petersburgh	1,290
Riga	1,162
Sound, passed (4,426 British)	13,247
Swinemunde	809
Smyrna, about	500
Sydney	120
Trieste	280

In some of the above, the returns apply only to foreign trade. Others include vessels of all kinds.

The following are the duties of Customs or Excise, collected on the principal imports into the United Kingdom.

Tea, an excise duty equal to the selling prices at the India sales.

	l.	s.	d.
Sugar, viz. brown, muscovado, clayed sugar, not refined . . cwt.	3	3	0
Ditto, produce of, imported from a British Possession within the limits of E. I. Company's Charter cwt.	1	12	0
Ditto, produce of British Possessions in America cwt.	1	4	0
Ditto, refined . cwt.	8	8	0
Coffee, produce of B. P. lb.	0	0	6
Ditto, Sierra Leone, lb.	0	0	9
Ditto, imported from B. P. within limits of E. I. Co.'s Charter . . lb.	0	0	9
Ditto, imported from other places in India . lb.	0	1	0
Cocoa nuts . . lb.	0	0	6
Ditto, produce of B. P. lb.	0	0	2
Chocolate . . lb.	0	4	4
Ditto, produce of B. P. lb.	0	1	9
Cotton manufactures, for 100l. value . .	10	0	0
Hemp, dressed . cwt.	4	15	0
Ditto, undressed . cwt.	0	0	1
Flax, ditto . . cwt.	0	0	1
Wool (sheep's) und. 1s. per lb.	0	0	0½
Ditto, above ditto . lb.	0	0	1
Lace, for the 100l. value .	30	0	0
Silk, raw . . lb.	0	0	1
Ditto, thrown, singles lb.	0	1	6
tram lb.	0	2	0
Silk, thrown, dyed, viz.			
singles . . lb.	0	3	0
organzine . lb.	0	5	2
Silk manufactures, 100l. value	30	0	0
Gloves, habits, per dozen pair	0	4	0
Ditto, men's ditto . . .	0	5	0
Ditto, women's ditto . .	0	7	0
Timber, foreign, per load .	2	15	0
Ditto, produce of B. P. do.	0	10	0
Tallow, foreign . cwt.	0	3	2
Ditto, imported from B.P. cwt.	0	1	0
Wax, bees', unbleached, cwt.	3	0	0
Ditto, bleached, cwt.	4	10	0
Oil, olive . . ton	8	8	0
Ditto, train, British fishing, ton	1	0	0
Ditto, foreign ton	20	12	0
Ditto, palm . . cwt.	0	2	6
Tobacco, unmanufac. for. lb.	0	3	0
Do. prod. of B.P. in America, lb.	0	2	9
Cigars . . lb.	0	9	0
Snuff . . . lb.	0	6	0
Hides, wet & not dressed, cwt.	0	4	8
Ditto, dry ditto . cwt.	0	2	4
Wine, except Cape . gal.	0	5	6
Ditto, Cape . . gal.	0	2	9
Brandy . . . gal.	1	2	6
Rum, produce of B. P. gal.	0	9	0
Hollands . . gal.	1	2	6
Vinegar . . . ton.	18	18	0
Quicksilver . . lb.	0	0	1
Drugs . . . cwt.	0	10	0
Books printed before 1801, cwt.	1	0	0
Ditto, since 1801, cwt.	5	0	0
Prints, plain . each	0	0	1
Ditto, coloured . each	0	0	2
Pictures, each, 1s., and further, for every square foot	0	1	0
Paper-hangings, per square yd.	0	1	0
Clocks and watches, 100l. val.	25	0	0
Jewellery . . ditto	20	0	0
Toys . . . ditto	20	0	0
Wheat, when the price is at or above 44s. and under 45s. per quarter . qr.	2	2	8

And for every shilling it increases in price, 1s. is deducted from the duty.

Ships pay, according to the port they come from, 2½d. to 2s. 1d. per ton.

POPULATION.

Returns of the Population of each County of England and Wales.

ENGLAND.	1700.	1750.	1801.	1811.	1821.	1831.
Middlesex . . .	624,200	641,500	818,129	953,276	1,144,531	1,358,200
Lancaster . . .	166,200	297,400	672,731	828,309	1,052,859	1,335,800
York, West Riding	236,700	361,500	563,953	653,315	799,359	976,400
Devon	248,200	272,200	343,001	383,308	439,040	494,400
Surrey	154,900	207,100	269,043	323,851	398,658	485,700
Kent	153,800	190,000	307,624	373,095	426,016	478,400
Somerset . . .	195,900	224,500	273,750	303,180	355,314	402,500
Stafford	117,200	160,000	239,153	295,153	341,040	410,400
Norfolk	210,200	215,100	273,371	291,999	344,368	390,000
Gloucester . . .	155,200	207,800	250,809	285,514	335,843	386,700
Warwick	96,600	140,000	208,190	228,735	274,392	337,600
Chester	107,000	131,600	191,751	227,031	270,098	334,314
Lincoln	180,000	160,200	208,557	237,891	283,058	317,400
Essex	159,200	167,800	226,437	252,473	289,424	317,200
Southampton . .	118,700	137,500	219,656	245,080	283,298	314,700
Cornwall	105,800	135,000	188,269	216,667	257,447	301,000
Suffolk	152,700	156,800	210,431	234,211	270,542	296,300
Sussex	91,400	107,400	159,311	190,083	233,019	272,300
Durham	95,500	135,000	160,361	177,625	207,673	253,700
Wilts	153,900	168,400	185,107	193,828	222,157	240,100
Derby	93,800	109,500	161,142	185,487	213,333	236,900
Nottingham . .	65,200	77,600	140,350	162,900	186,873	225,400
Northumberland .	118,000	141,700	157,101	172,161	198,965	223,000
Salop	101,600	130,300	167,639	194,298	206,153	222,800
York, East Riding	96,200	85,500	139,433	167,353	190,449	204,261
Ditto, North do. .	98,600	117,200	155,506	165,506	183,381	190,800
Worcester . . .	88,200	108,000	139,333	160,546	184,424	211,400
Leicester . . .	80,000	95,000	130,081	150,419	174,571	197,000
Northampton . .	119,500	123,300	131,757	141,353	162,483	179,300
Cumberland . .	62,300	86,900	117,230	133,744	156,124	171,700
Dorset	90,000	96,400	115,319	124,693	144,499	159,400
Oxford	79,000	92,400	109,620	119,191	136,971	152,100
Buckingham . .	80,500	90,700	107,444	117,650	134,068	146,400
Berks	74,700	92,700	109,215	118,277	131,977	145,200
Hertford	70,500	86,500	97,577	111,654	129,714	143,300
Cambridge . . .	76,000	72,000	89,346	101,109	121,909	143,200
Hereford	60,900	74,100	89,191	94,073	103,243	110,300
Monmouth . . .	39,700	40,600	45,582	62,127	71,833	98,200
Bedford	48,500	53,900	63,393	70,213	83,716	95,400
Westmoreland .	28,000	36,300	41,617	45,922	51,359	55,000
Huntingdon . . .	34,700	32,500	37,568	42,208	48,771	53,100
Rutland	16,600	13,800	16,356	16,380	18,487	19,400
WALES.	5108,500	6017,700	8331,434	9,551,888	11,261,437	13,086,675
Denbigh	39,700	46,900	60,352	64,240	76,511	82,800
Montgomery . .	27,400	37,000	47,978	51,931	59,899	65,700
Carnarvon . . .	24,800	36,200	41,521	49,336	57,958	66,500
Flint	19,500	29,700	39,622	46,518	53,784	60,100
Anglesea	22,800	26,900	33,806	37,045	45,063	48,300
Merioneth . . .	23,800	30,900	29,506	30,924	34,382	34,500
Glamorgan . . .	49,700	55,200	71,525	85,067	101,737	126,200
Carmarthen . .	49,700	62,000	67,317	77,217	90,239	100,800
Pembroke . . .	41,300	44,800	56,280	60,615	74,009	89,900
Cardigan	25,300	32,000	42,956	50,200	57,784	64,700
Brecon	27,200	29,400	31,633	37,735	43,613	47,800
Radnor	15,300	19,200	19,050	20,900	22,459	24,700
England & Wales	5475,000	6467,000	8872,980	10,163,676	11,978,875	13,889,675

SCOTLAND.	1755.	1798.	1801.	1811.	1821.	1831.
Aberdeen . . .	116,836	122,921	123,082	135,075	155,387	177,853
Argyle	63,291	76,101	71,859	85,585	97,316	101,425
Ayr	59,268	75,544	84,306	103,954	127,299	145,167
Banff	36,521	38,487	35,807	36,668	43,561	48,604
Berwick	24,946	30,875	30,621	30,779	33,385	34,084
Bute	6,866	10,563	11,791	12,033	13,797	14,134
Caithness	22,215	24,802	22,609	23,419	30,238	34,529
Clackmannan . .	0,008	8,749	10,858	12,010	13,263	14,729
Dumfries . . .	41,913	52,329	54,597	62,960	27,317	73,770
Dumbarton . . .	13,857	18,408	20,710	24,189	70,878	33,211
Edinburgh . . .	90,412	122,655	122,954	148,607	191,514	219,345
Elgin, or Moray .	28,934	26,080	26,705	28,108	31,162	34,231
Fife	81,570	87,250	93,743	101,272	114,556	128,981
Forfar	68,297	91,001	99,127	107,264	113,430	139,604
Haddington . . .	29,709	28,906	29,986	31,164	35,127	36,145
Inverness . . .	64,656	73,979	74,292	78,336	90,157	94,779
Kincardine . . .	24,346	26,799	26,349	27,439	29,118	31,429
Kinross	4,880	5,302	6,725	7,245	7,762	9,072
Kircudbright . .	21,205	26,959	29,211	33,684	38,903	40,590
Lanark	81,726	125,254	146,699	191,752	244,387	316,790
Linlithgow . . .	16,829	17,570	17,844	19,451	22,685	23,291
Nairn	5,694	6,054	8,257	8,251	9,006	9,354
Orkney & Shetland	38,591	43,239	46,824	46,153	53,124	58,239
Peebles	8,908	8,107	8,735	9,935	10,016	10,578
Perth	118,903	133,274	126,366	135,093	139,050	142,822
Renfrew	26,645	62,853	78,056	92,596	112,175	133,143
Ross and Cromarty	47,656	55,430	55,343	60,853	68,828	74,838
Roxburgh . . .	31,273	32,020	33,682	37,230	40,892	43,663
Selkirk	4,368	4,314	5,070	5,889	6,637	6,833
Stirling	38,813	46,613	50,825	58,174	65,376	72,621
Sutherland . . .	20,770	22,961	23,117	23,629	23,840	25,518
Wigtown . . .	16,166	20,983	22,918	26,891	33,240	36,258
Totals . . .	1265,380	1526,492	1599,068	1,805,688	2,093,456	2,365,930

IRELAND IN 1823.

Antrim . .	270,883	Kildare . .	99,066	Queen's County	134,275
Armagh . .	107,427	Kilkenny . .	181,946	Roscommon .	208,729
Carlow . .	78,595	King's County .	131,088	Sligo . . .	146,229
Cavan . .	195,076	Leitrim . .	124,785	Tipperary . .	346,896
Clare . . .	208,089	Limerick . .	277,477	Tyrone . .	261,665
Cork . . .	730,444	Londonderry .	193,860	Waterford .	156,611
Donegal . .	248.274	Longford . .	107,570	Westmeath .	128,819
Down . . .	325,410	Louth . . .	124,129	Wexford . .	170,805
Dublin . .	335,895	Mayo . . .	293,112	Wicklow . .	116,767
Fermanagh .	130,998	Meath . . .	159,183		
Galway . .	337,374	Monaghan . .	174,679	Total . .	6,801,827
Kerry . .	216,189				

The Counties contain totals as under :

Forty-two English .	13,086,075
Twelve Welsh . .	803,606
Thirty-two Scotch .	2,365,936
Great Britain, 1831 .	16,252,605
Ireland, 1823 . .	6,801,827
Total, United Kingdom .	23,054,432

Ireland is above seven millions, and the British, in Colonies, &c. are full two millions.

Middlesex and Lancashire contain 1,358,200 and 1,335,800; and the West Riding of Yorkshire, 976,400.

The ratio of increase of the returned population is:

1700 to 1831. . . .	2.382 to 1.
1750 to —— . . .	2.098 to 1.
1801 to —— . . .	1.515 to 1.
1821 to —— . . .	1.152 to 1.

The ratio of the increase of the agricultural districts, from 1801 to 1831, is 1.396 to 1.

Of the manufacturing, in same time, 1.742 to 1.

Of the metropolitan, 1.582 to 1.

Hence, if the return in 1750 could be relied on, we have doubled in 81 years. But if we add a third to 1750, and make it equal to the low return of 1801, the ratio would be 1.515 to 1, or rather above 3 to 2, in 80 years, likely to be the fact.

Market Towns, containing above Six Thousand Inhabitants.

Agnes, St.	6,612	Gosport	12,637	Reading	15,595
Aldstone	6,858	Hales-owen	9,765	Redruth	8,191
Alnwick	6,285	Halifax	15,382	Richmond, (Surry)	7,243
Aston	33,597	Hanley	7,121	Rochdale	26,404
Austle, St.	8,758	Haslingden	7,776	Rochester	9,891
Barnsley	10,330	Hastings	10,097	Ruabon	8,353
Barnstaple	6,840	Heaton Norris	11,238	Saddleworth, &c.	15,986
Bath	38,063	Hemel Hempstead	6,037	Salford	40,786
Belper	7,890	Hereford	10,280	Salisbury	6,876
Berwick	8,920	High Wycombe	6,299	Scarborough	8,760
Beverley	8,302	Hinckley	6,468	Sculcoats	13,468
Bilston	14,192	Holbeck	11,210	Sheffield	59,011
Birmingham	110,914	Holywell	8,969	Shelton	9,267
with Ashton, &c.	142,201	Huddersfield	19,035	Shields, North	6,744
Bishop's Wearmouth	14,825	Hull	32,958	Shields, South	9,074
Blackburn	27,091	Hunslet	12,074	Shrewsbury	23,422
Bolton-le-Moor	28,299	Hythe	7,144	Southampton	19,324
Boston	11,240	Ipswich	20,454	Sowerby Bridge	6,457
Bradford, Y.	23,233	Kendal	10,015	Spalding	6,497
Ditto W.	10,102	Kidderminster	14,981	Stafford	6,998
Brentford	9,336	Lancaster	12,613	Stamford	6,172
Brighton	40,033	Lane-end	9,088	Stockport	65,909
Bristol & Clifton	71,106	Leamington	6,209	Stockton	7,703
Bromsgrove	8,612	Leeds	123,393	Stone	7,808
Burnley	7,551	Leek	6,374	Stonehouse, East	9,571
Burslem	12,714	Leicester	39,306	Stourbridge	6,148
Burton on Trent	6,455	Lewes	8,592	Sunderland	17,060
Bury St. Ed.	11,436	Lichfield	6,499	Swansea	13,694
Bury, Lanca.	15,086	Lincoln	11,892	Taunton	11,139
Cambridge	20,917	Liverpool	165,175	Tipton	14,951
Cardiff	6,187	Llanelly	7,646	Tiverton	9,766
Carlisle	20,006	Loughborough	10,800	Todmorden	6,054
Carmarthen	9,993	Louth	6,927	Tonbridge	10,380
Caernarvon	7,642	Lynn	13,370	Trowbridge	10,863
Castleton, I. of M.	11,079	Macclesfield	23,129	Tynemouth	10,182
Chatham	17,430	Maidstone	15,387	Wakefield	12,232
Cheltenham	22,942	Manchester	142,026	Walsall	15,066
Chester	21,363	Mansfield	9,426	Wandsworth	6,879
Chichester	8,270	Margate	10,930	Warminster	6,115
Chipping Wycombe	6,299	Merthyr Tydvill	22,083	Warrington	16,018
Chorley	9,282	Middleton	6,903	Warwick	9,109
Colchester	16,167	Mold	8,086	Wath	6,927
Colne	8,080	Monkwearmouth	6,051	Wearmouths	20,886
Congleton	9,352	Newark	9,557	Wednesbury	8,437
Coventry	27,070	Newcastle-upon-T.	42,760	Welsh Pool	6,311
Croydon	12,447	Ditto, under-Lyne	8,192	Wellington	9,671
Darlington	8,574	Newport, Mon.	7,062	Wells	6,649
Deal	7,268	Northampton	15,351	Whaley Bridge	97,751
Derby	23,607	Norwich	61,110	Whitby	7,765
Devonport	34,883	Nottingham	50,680	Whitehaven	11,303
Dewsbury	8,272	Nuneaton	7,799	Wigan	20,774
Doncaster	10,801	Oldham	67,579	Wisbeach	8,777
Dover	11,924	Oxford	20,434	Wolverhampton	24,732
Dudley	23,043	Pembroke	6,511	Woolwich	17,661
Durham	10,125	Penrith	6,059	Worcester	25,000
Ellesmere	6,540	Penzance	6,563	Workington	6,413
Ely	6,189	Plymouth	31,080	Worsley	7,839
Enfield	8,812	Pontypool	10,280	Wrexham	5,484
Exeter	28,201	Poole	6,459	Wycombe	6,299
Frome	12,240	Portsea	42,306	Yarmouth	18,040
Gainsborough	6,658	Portsmouth	8,083	York	25,359
Gateshead	15,177	Preston	33,112		
Gloucester	11,933	Ramsgate	7,985		

Towns in Scotland, above Six Thousand Inhabitants.

Aberbrothwick .	6,660	Dysart	7,004	Lanark	7,672
Aberdeen, N. & O.	57,029	Edinburgh, &c. .	265,263	Leith, N. & S. .	25,855
Alloa	6,377	Elgin	6,130	Montrose . . .	12,055
Ayr	7,605	Falkirk	12,743	Paisley . . .	31,460
Brechin . . .	6,508	Forfar	7,949	Perth	20,016
Campbeltown. .	9,472	Glasgow . . .	202,426	Peterhead . . .	6,695
Cupar	6,473	Greenock . . .	27,571	Rothesay . . .	6,084
Dumfries . . .	11,606	Hamilton . . .	9,513	Stirling	8,340
Dundee	45,355	Inverness . . .	14,324	Wick	9,850
Dumferline . .	17,068	Kilmarnock . .	18,093		

Scotland contains 5,342,831 cultivated English acres, and 13,900,557 uncoltivated.

IRELAND.—TOWNS.

Armsgh . . .	8,493	Coleraine, Derry	9,639	Kilkenny . . .	23,230
Athlone, Westm.	7,543	Cork	100,658	Kinsale, Cork .	7,068
Bandon, Cork .	10,179	Cove, Cork , .	6,508	Limerick . . .	50,045
Belfast, Autrim .	37,277	Dublin	227,335	Londonderry, Der.	16,970
Carlow	5,035	Dundalk, Louth	9,256	Newry, Down .	7,470
Carrickfergus, An.	8,023	Ennis, Clare . .	6,701	Sligo	9,283
Carrick, Tipperary	7,466	Fermoy, Cork .	6,702	Waterford. . .	28,679
Clonmell, Tipp. .	15,290	Galway	27,775	Wexford . . .	11,600

Guernsey, in 1821, contained 4298 families in 3083 houses. Jersey, in 1831, 36,582 inhabitants; and the Isle of Mah, in 1831, 40,985 inhabitants.

Between 1760 and 1810, the marriages in England and Wales were to the registered baptisms as 100 to 366, 356, 340, and 350. In 1760, the marriages were 52,666; and the baptisms, 192,900. In 1700, the baptisms were 152,000; in 1800, 255,000; and, in 1810, 298,853. On these data, the population is calculated, in 1700, to have been but five and a half millions. In the ten years, from 1801 to 1811, the registered baptisms were 2,878,906; and, the burials, 1,950,189; showing an increase of 928,717, in the ten years. There appears, in England, to be one baptism per annum to 33 persons, one burial to 49, and one marriage to 120; and, in Wales, 37, 60, and 136. In 1810, the burials were 208,144,—10,356 unentered; and, of baptisms, 298,853,—the unentered, 14,860. The marriages were 84,470,—195. In 1820, the marriages were 96,833; the baptisms, 343,660; and the burials, 208,349.

The Marriages in England and Wales were—

In 1760 ...	57,848	In 1810 ...	84,470
In 1800 ...	69,851	In 1820 ...	96,833

The Baptisms—

In 1760 ...	192,914	In 1810 ...	298,853
In 1800 ...	254,870	In 1820 ...	343,660

The Burials—

In 1760 ...	161,004	In 1810 ...	208,184
In 1800 ...	208,063	In 1820 ...	208,349

The average number of burials, in England and Wales, per annum, for 10 years, between 1810 and 1820, was 201,000. In 1801, the burials were 204,434; but, in 1805, only 181,240. From 1800 to 1810, the average was 195,019, which indicates an increase of population of 1 36th in 10 years, or a doubling in 360 years. In London, from 1801 to 1810, there were marriages, 12,060; baptisms, 28,490; and burials, 23,310.

The average nomber of marriages, from 1801 to 1810, was 83,209; and, from 1811 to 1820, was 91,042, or one-eleventh.

In 1803, there were 94,379; and 1815, 99,944, both years of peace.

The baptisms, in 1803 and 4, were 294,000; and, in 1817 and 18, 331,000. The average, from 1801 to 1810, being 287,890; and, from 1811 to 1820, 325,506, or one-eighth increase: but half die before 20, and, therefore, the effective iocrease is but one-sixteenth.

The ratio of baptisms to every 100 marriages, is abont 3.5. In 1820, it had risen, from some cause, to 3.8. Hence every 20 has 35 or 38 children; and if four-tenths of the whole do not marry, the increase is at 33.33 to 35 or 38 in a generation. For in Englaod and Wales, on a popolation of ten millions, in the thirty years from 1790 to 1820, there were 3,137,635 marriages, which included 6,275,270 persons; and, excluding widows and widowers, we may call them six millions or six-tenths, so that four-tenths, or two in three, do not marry. That is, of 333 born, 200 marry, and have 350 or 380 children, and 133 do not marry; so that, in the next generation, there are 350 or 380, instead of 333, or, at a mean, 365 for 333; which, allowing for increase on increase, woold be a doubling, in eight or nine generations, or about 260 years, as confirmed by the best authorities and various other data.

The burials, in thirty years, in England and Wales, were 7,871,253; which, on ten millions, gives about thirty-eight years for the average term of life.

The christenings aod borials in Lon-

don, or within the bills, 147 parishes, *i. e.* 97 within the walls, 17 without, 10 in Westminster, and 23 in Middlesex and Surrey, were—

		Christenings.	*Burials.*
In 1772	...	17916	26053
1773	...	16805	21656
1774	...	16998	20884
1775	...	17629	20514
1782	...	17101	17918
1783	...	17091	19029
1784	...	17179	178.8
1785	...	17910	18919
1802	...	19918	19379
1803	...	20943	19582
1804	...	21543	17038
1805	...	20295	17567
1812	...	20399	19089
1813	...	21528	17323
1814	...	20170	19738
1815	...	23414	19560
1820	...	26158	19348
1821	...	25232	18451
1830	...	26743	21645

The annual births at Paris are 21,000.

In Great Britain, the number, from 15 to 60, able to bear arms, is nearly three millions. 1 in 21 marriages have no children, and the rest $3\frac{1}{4}$ to $3\frac{3}{4}$ per marriage. The twin births are 1 to 65. The male births to females 96 to 95.

In 1829, there were, in England and Wales, 6939 lunatics, and 6505 idiots. In Scotland, the numbers, by the last return, were 3652 insane. In both countries, the numbers have considerably increased.

About the third of all population is taken to be males, from 16 to 65.

Of every 10,000 males and females in England, there are

Age.	*Males.*	*Females.*
Under 5	1538	1444
5 to 10	1343	1268
10 to 20	2157	2051
20 to 30	1470	1684
30 to 40	1155	1210
40 to 50	040	933
50 to 60	666	653
60 to 70	448	458
70 to 80	222	228
80 and upwards	61	70

Those above 70 are but 283 males, and 298 females; and, if those in want above that age were liberally provided for, it would be a trifling charge for a great duty.

In Wales, above 80, the numbers are 82 males and 116 females. In Scotland, 65 and 73; and, in London, 24 and 38.

The New Forest now contains 14,390; Isle of Wight, 35,363; the Orkneys, 29,392; the Shetlands, 29,847; Skye, 22,736; Lewis, 14,541; Islay, 14,992; and Harries, 3,900.

The numbers for 1821 and 1831 prove that the increases have arisen chiefly from increased accuracy.

The people of the United Kingdom consist of the hereditary aristocracy, who are land proprietors, constituting about 3 or 4000 families, as heads and branches.

Of squires and gentlemen, who are land proprietors, stock-holders, money-lenders, &c. of whom there are 50 or 60,000 families.

Of learned professions, about 120,000.

Of farming tenants, or yeomanry, about 250,000 families.

Of their labourers, &c. 400,000.

Of interchangers, merchants, shopkeepers, &c. 900,000.

Of artizans, carpenters, smiths, &c. 200,000 families.

Of manufacturers in all lines, 500,000.

Of labourers, porters, servants, &c. to manufacturers, &c. 600,000 families.

Of destitute paupers, soldiers, &c. about 800,000 families.

Another analysis of occupations, by Mr. Marshall.

	1821.	1831.
1 Agricultural occupiers	250,000	250,000
2 Do. labourers	728,956	850,000
3 Mining do.	110,000	120,000
4 Millers, bakers, butchers	180,000	200,000
5 Artificers, builders, &c.	250,000	280,000
6 Manufacturers	340,000	400,000
7 Handicraftsmen	150,000	180,000
8 Interchangers, or shopkeepers	310,239	400,000
9 Professional service	80,000	90,000
10 Disabled paupers	100,000	110,000
11 Annuitants, proprietors, &c.	432,488	600,000
Total Number of Families	2,941,383	3,480,000

The learned professions consist, in Great Britain, of about 36,000 ministers of religion of all denominations, about 30,000 lawyers, and law employments, and of 50,000 physicians, surgeons, apothecaries, and druggists, making 116,000 families, with half as many more dependants; or 174,000 families of the 3 millions; or 1 to every 55 families for divinity, 1 to every 66 for law, and 1 to every 40 for physic. But of the three, 1 to every 17 families.

The Returns of 1831 make the population of Glasgow 202,426, double in 1811; and that of Edinburgh, 161,909, double in 1801.

Manchester has increased from 27,000 in 1723, to 142,026 in 1831.

Birmingham, from 20,000 in 1721, to 110,914 in 1831.

The greatest ratio of increase is Merthyr Tydvill, in 1801, 7003; in 1811, 11,104; in 1821, 17,404; and, in 1831, 22,083. And Leeds, from 53,162 in 1801, to 123,303 in 1831.

Of 10,000 born in the same year, those numbers before any period would show the deaths, and the following the living; as, for example, at 50 there will be living of Males · 666

60 to 70 · · ·	448
70 to 80 · · ·	222
Above 80 · ·	61
	1397
And dead	8603 before 50.
	10,000

Hence, of 10,000 males born at the same time, there would

At 5, be living ·	8462
At 10 · · ·	7119
At 20 · · ·	4762
At 30 · · ·	3492
At 40 · · ·	3337
At 50 · · ·	1377
At 60 · · ·	731
At 70 · · ·	283
At 80 · · ·	61
At 90 · · ·	4½
(Or 9 in 20,000)	
At 100 · · ·	⅙
(Or 1 in 60,000.)	

There were, in 1821, 78,013 in Great Britain, between 50 and 90, and only 13,779 in Ireland; and 6919 in Great Britain from 90 to 100, and only 1963 in Ireland; while, above 100, there were but 291 in Great Britain, and 349 in Ireland.

The poll-tax in England and Wales, in 1377, made returns of the population paying of 2,300,000*l.*; and, if we suppose the children and paupers to be another million, the population of England and Wales would at that time be 3,300,000. In 1690, the hearth-tax gave a population of about six millions, or double in 300 years; and the returns of 1821 gave 12 millions, consequently, in a period of 444 years, the numbers appear to have nearly quadrupled, which gives 222 years for the true period of doubling, including all the circumstances to which a population is liable, and Britain possesses peculiar exemptions in its insular situation.

The proportion of population of Exeter, in 1377, to that in 1821, was only as 1 to 10. In Plymouth, as 1 to 3½. In Dartmouth, as 1 to 5. In the county of Devon, the proportions were as 1 to 6, which makes a doubling of the population, if the subsidy was strictly enforced, in every 200 years. It is estimated that the population of Devonshire, by Doomsday-book, in 1086, was about 100,000; and, in 1821, it was 439,000, making a doubling in about 350 years.

570 paid in Bath, 1172 in Wells, and 54,603 for the rest of Somersetshire; but, by the returns in 1821, Bath would have paid on 28,000, Wells on 3690, and the rest of the county on 195,380, being about quadruple in 444 years, or a doubling in 222 years; but as the assessment would be excused or evaded by a third, the doubling would be in 333 years. The increase of towns proves nothing, since it arises from varied habits and speculations.

Mr. Sadler, in his work on population, has utterly destroyed the Malthusian theories about doubling in 25 or 30 years, yet this theory continues still to be quoted by half-informed persons, as worthy of sober consideration. Sir W. Petty estimated a doubling in 250 years; but as to England, it is doubted by many authorities, whether, in the days of the Plantagenets, it did not contain full half as many as at present, and a third as many at the time of the Norman Conquest, which would afford a doubling only in 400 years.

The army and navy were returned, in 1801, at 471,000; in 1811, at 640,500; in 1821, at 319,300; and, in 1831, at 320,000. In 1781, they were 250,000, and in 1791, 200,000.

It appears, from Mr. Marshall's Analysis of the Population, in 1821 and 1831, that, in the mining and hardware districts, the population had increased *one-third*; in the cotton, wool, &c. districts *one fourth*; in the metropolis, and port towns, *one sixth*; and in the inland towns and agricultural districts, only *one-eleventh*. The total being between a 6th and 7th.

In regard to employments, the *agricultural* are about a third, the *trading* and mining nearly half, and the *unproductive* nearly a fifth. And since the traders in the agricultural parishes are as about 1 to 5, and the population of the mining and manufacturing districts is about 5 millions, it follows, that 4½ millions of the population of the mining and manufacturing districts in Great Britain are dependant on manufactures for general use or exportation.

By the police registers in France, it appeared that in October, 1829, there were 36,000 Englishmen residing in France, which included 7000 artizans and manufacturers.

The number of families in Ireland, in 1824, were 1,312,032, making 3,341,920 males, and 3,559,901 females; 1,138,069 were agricultural, 1,170,044 trading and manufacturing, and 528,702 in other occupations, and the idle or unoccupied 2,830,815; or five-sixths of the population living on the labours of the sixth employed in agriculture, *i. e.* 1 to 6 instead of 3 to 2.

The four provinces, and the houses and population in 1823 were as under:—

	Houses.	Population
Ulster (North)	346,349	2,001,966
Connaught (West)	191,267	1,053,918
Leinster (East)	284,673	1,785,702
Munster (South)	343,201	2,005,363
Totals (1824)	1,312,032	6,801,827

The emigrants to the colonies, in 1827, were 17,371; and, in 1825, 10,422.

In April and May, 1832, 6544 emigrants arrived in Canada, from the United Kingdom, 3740 from England, 1257 from Ireland, 620 Scotch, and 27 Welsh. It is a horrid and lamentable fact, that these people are hurried out of the country, owing to the most absurd theory about the unusual increase of population.

The burials and baptisms, every 20th year, have been as onder in London:

	Burials.	Baptisms.
1726	27,310	16,652
1746	28,157	14,557
1766	23,911	16,257
1786	20,454	18,119
1806	17,938	20,380
1826	20,758	22,244
1830	21,645	26,743

From 1658 to 1726, the borials varied from 18,000 to 24, 25, 28, and even 29,000, being, in 1699, 20,795, and 1691, 22,691, though the population, in 1700, was but 674,000 and, in 1830, 1,400,000.

Of 25,337 burials in London, in 1831, 2677 died of old age, and 7144 under two years, and 10,459 under five. Of small-pox 563, measles 750, 485 of apoplexy, 4807 of consumption, 1061 of asthma, 246 palsy, 226 insane, and 207 of mortification. grief 25, dropsy 1108, inflammation 2812.

Of 25,262 burials in 1731, 1675 died of old age, 10,287 under two years, small-pox 2640, measles 102, apoplexy 237, consumption 3425, asthma 469, palsy 38, insane 21, mortification 189, grief 14, dropsy 1047, inflammation 12.

In 1681 of 23,971 burials, 5571 were under two years, 1301 of old age, small-pox 2982, measles 121, apoplexy 94, palsy 20, consumption 3784, insane 16, grief 11, dropsy 958.

The classification has varied: in 1831, we have 2812 inflammations, but in 1731 but 12, and in 1681, the term does not occor. Consumption is the fixed scourge.

The burials within the bills, per Marshall, were as under:

1747	23,494
1801	19,374
1823	20,587
1830	21,645

In 1603, 36,209 died in London of the plague; in 1625, 35,416; in 1636, 10,400; and, in 1665, 68,596, chiefly in August aod September; in the latter year 7165 dying in the week ending Sept. 19. The first two died in April, and continued through the winter, nearly 300 per week dying in December, and 1998 in 1666.

Parish registers of fatal diseases, &c. in London, originated in 1538, and have been continued since 1592 and 1603, by the worshipfol fraternity of Parish Clerks, incorporated in 1625. The reports are made by aged females, called *Searchers*, two of whom are appointed for every parish.

It appears by Mr. Marshall's abstracts, that, in 1631, the population of London was but 130,178, and in 1700 but 200,300. The deaths in 1631 as 1 to 21; in 1700 as 1 to 24; in 1750 as 1 to 26; and in 1820 as 1 to 52.

Wallace, in a work on the numbers of mankind, developed the principle of increase of nombers in higher ratio than increase of food, which was adopted and copied by Malthus. While, however, the surface of the earth is so inadequately inhabited, and there are 50,000 millions acres of land, 40,000 millions of which is capable of production, all such speculations are as idle and contemptible as the reveries of the fathers and monks in the age of St. Jerome. The governments and aristocracies of all countries prevent too great an increase by their oppressions and monopolies, owing to which the people are forced to flee to forests in America. Hence the continued tide westward for the last fifty centuries.

The population of the world was, for two centuries, taken at 800 and 1000 millions, but more accurate information leads to its reduction to 750 or 650 millions.

The population of Spain, 1825, was 13,953,959, or 70 per square mile, being an increase in 35 years of 34 per cent. That of Portugal, assuming the same rate of increase, was 4¾ millions.

That of Sweden in 1825 was 2,751,582. In the 62,900 deaths in Sweden in 1820, 3227 men died of old age, and 5000 women.

The population of Norway was taken, in 1815, at 835,000, and taken again, in 1825, at one million. Of course, there was a deficiency in the first account, or Norway, in 1775, must have been without inhabitants, and all aocounts indicate that it has been nearly as populous as at present for the last 200 years. The population of Prussia, at the close of 1831, was 13 millions, and in three years there had been an increase of a quarter of a million. Emigration is about 24,000 per annum.

For another view of populatioo, see Geography; but there is no reason to

believe that the average numbers of the human race have doubled since the days of the Cæsars.

The following is the population of some of the principal places in the United States, according to the last census:—New York, 213,107; Philadelphia, 161,412; Baltimore, 80,519; Boston and Charleston, 70,164; New Orleans, 48,674; Charleston, S. C., 30,289; Cincinnati and suburbs, 26,513; Albany, 24,516; Washington city, D. C., 18,823; Providence, R. I., 17,832; Pittsburgh, 17,313; Richmond, Vir. 16,085.

American Population in 1830:—

Eastern States	1,659,854	1,954,682
Middle ditto	3,179,944	4,108,959
Southern ditto	2,547,726	3,022,812
Western ditto	1,414,729	2,263,103
South-western do.	779,569	1,367,471
Territories	56,181	136,611
Census of 1820	9,637,299	
Ditto 1830		12,976,649

The partition of Poland between Russia, Austria, and Prussia, took place at three distinct epochs, 1772, 1793, and 1795, and the result of the whole has been as follows:—

	Square Miles.	Population.
To Austria	64,000	4,700,000
To Prussia	62,000	3,600,000
To Russia	158,000	6,700,000

By a recent census, it appears that in a population of 5,456,664 persons, that of the kingdom of Naples, there are 37 above 100 years of age, 93 prelates, 27,912 priests, 8455 monks, and 8185 nuns. It also appears, that the city of Naples contains 349,190 inhabitants, 3 cardinals, 1 archbishop, 8 bishops, 1751 priests, 610 monks, 827 nuns, 18,100 state-pensioners, 9450 persons in public offices, and 114,519 workmen.

Between the kingdom of Naples and the Grand Duchy of Tuscany, on a surface of 13,000 square miles, vegetates and begs a pauper population of 2,600,000 souls, subject to the Pope.

The extent of the Lombardo-Venetian kingdom is 17,800 square miles, the population 4,930,000.

Population of Rome in 1830:—parish-churches, 54; families, 34,805; bishops, 30; priests, 1455; monks and friars, 1986; nuns, 1385; seminarists and collegians, 560; heretics, Turks, and infidels, exclusively of Jews, 266; males, 77,475; females, 69,810. Total population, 147,385.

In Italy, of 100 infants born in December, January, and February, 66 die in the first month, 15 more in the course of the year, and 19 survive; of 100 born in spring, 48 survive the first year; of 100 born in summer, 83 survive the first year; of 100 born in autumn, 58 survive the same period.

The births in Paris, in 1829, amounted to 28,720, of which, 14,869 were boys, and 13,961 girls. Of this number, 1856 were born in wedlock, and 10,153 were illegitimate. But 2103 natural children were of known parents. Bachelors and spinsters, 5873; bachelors and widows, 349; widowers and spinsters, 710. During the same year, the number of deaths in private houses were 15,268; in the civil and military hospitals and the prisons, 10,047; 276 bodies were found in the Morgue. Total, 25,591. During 1828, 128 attained their hundredth year.

Marriages	399,345	Deaths	1,216,708
Births	1,922,695		

Dr. Clarke estimates the annual mortality of London at 1 in 40;—Paris, 32; Nice, 31; Naples, 28; Leghorn, 35; Berlin, 34; Madrid, 29; Rome, 25; Amsterdam, 24; Vienna, 22.

The population of Europe, per square mile, is, Sweden, 14; Turkey, 36; Poland, 52; Spain, 63; Germany, 127; the United Kingdom, 152; France, 154; Italy, 172; and Holland, 224.

London, Paris, Petersburgh, Naples, and Vienna, are, in order, the most populous cities in Europe.

	Houses.	*Population.*
London	174,000	1,400,000
Paris	45,000	750,000
Petersburgh	9,000	430,000
Naples	40,000	360,000
Vienna	7,500	300,000

The population of Upper Canada, in 1831, was 234,865.

In 1820, about one-third of the inhabitants of the United States were employed in agriculture; but the hundredth in commerce, and one-twentieth in manufactures.

In 1820, the population of France was 30,319,444. There were 218,917 marriages, 957,876 births, and 764,848 deaths. The marriages being 2 of the population, were as 69 population to 1 marriage; the births at 32 to 1; and the deaths as 40 to 1, nearly. The male births to the female were as 16 to 15. Of 100 births, 50 died formerly under two years, now only 38.3. Under ten years, 55 formerly, now only 47.7. The deaths were 1 in 36, now 1 in 40. The births were 1 in 25, now 1 in 32. The results shew about four children to a marriage. The births are most numerous in March and April. In 1829, the population of Paris was 718,765, of whom, one-eighth were paupers. The births 25,126, and deaths 22,817. Marriages, 6465. Families, 224,922.

The average term of life has extended in France about four years, owing to vaccination, &c. The population, in 1830, was 32 millions, the marriages 250,342; the births, 964,343 (69,416 ille-

gitimate); and the deaths, 806,723; of whom, 158 were above 100. Paris, in 1830, had 28,597 births, and 27,460 deaths; 1069 between 80 and 100.

In the Hotel Dieu, at Paris, a fifth of the patients die, a tenth in the London hospitals, and a fifteenth in country ones.

The deaths in France, in 1820, were 770,706; in Great Britain, 208,314; and of births 958,933 to 343,360; indicating a proportion of 3½ to 1.

At 60, in ancient Italy, the expectation of life was 5 years; in modern France, 13 11; in England, 14.4; in Geneva, 11.5; and in England, by Finlayson's Tables, 14.39 for men, and 17.32 for women.

In modern Italy, the agricultural is to the non-agricultural population as 3 to 1; in France, as 2 to 1; but, in Britain, only as 1 to 3.5; and, hence the misery.

The population of the British Colonies is, white and free 2,229,725, and slaves 829,665, except those on the continent of Hindoostan.

The population of Malta is 105,000, and of Gozo 15,500. Of the 2 Canadas 620,000, and of Newfoundland, 60,000. Of Nova Scotia, &c. 250,000. Of Ceylon, nearly one million. Of Mauritius, 77,000, and of New South Wales, &c. about 25,000. Gibraltar contains 17,000.

Malte Brun estimates Hesse as 1 soldier to every 49 inhabitants; Prussia, to 68; Russia, to 90; Austria, to 100; France, to 110; England, to 140; and the Italian powers, 8 to 220.

Of 100,000 aged 25, there will be alive at 65, 53,950; and of 100,000 at 65, there would be alive at 80, 37,355. At 25, the expectation of life is 38.52 years, and, at 65, is 12½ years. At 25, an annuity of 1*l*. 4 per cent., is worth 17.634*l*., and at 65, worth 8.751*l*. Finlayson's Tables are preferred.

New York and Brooklyn, in 1830, had 216,000 inhabitants, and are as extensive as Paris.

About 16,000 emigrants, chiefly English, arrive annually at New York.

In 1831, 191 died in the Bills of Mortality from 90 to 100, and 3 from 100 to 105.

The ratio of marriages, per Marshall, on every 100, in 10 years, from 1801 to 1811, was 9.4; but from 1811 to 1821, it was but 7.67.

The ratio of baptisms on every 100 marriages was in 1790, 34.6; in 1800, 35.1; in 1810, 36.3; and in 1820, 38.

The population in 1811 was 10,163,676, and, in 1821, 11,978,875, the mean about 11 millions.

The marriages, in the 10 years from 1810 to 1820, were 910,426, the baptisms 3,585,727, the burials 2,105,028.

The population, in 1801, was 8,872,981, and 1811, 10,163,676, mean 9½ millions, nearly.

The marriages in the same period were 832,091, the baptisms 3,027,526, and the burials 2,053,749.

In 40 years, 1781 to 1820, the baptisms were 11,223,943, and burials 7,767,454.

Population 1801, 8,872.981.

The marriages in 40 years were :—	
1781 to 1790	672,535
1790 to 1800	722,583
1800 to 1810	832,091
1810 to 1820	910,426
The baptisms :—	
1781 to 1790	2,324,498
1790 to 1800	2,538,434
1800 to 1810	3,027,526
1810 to 1820	3,585,727
The burials :—	
1781 to 1790	1,822,902
1790 to 1800	1,889,574
1800 to 1810	2,053,749
1810 to 1820	2,105,028

Malthus, and others, who propose to forbid marriage, unless the parties can give security for providing for their children, forget the lottery of life, and that the most auspicious outset often ends in pauperism, and the most unpromising in affluence; while the children of paupers have often risen to the highest employments, and have even founded families of nobility.

The fundamental reply to Malthus is this, that, for the last 2 or 3000 years, the whole earth has probably been as populous as at present; and that if any ratio whatever of increase were assumed, it would, in 2 or 3000 years backward, depopulate the earth. Thus, in doubling in 100 years down to 1800, and then taking 1000 millions as the number in 1700, it would have been but 500 millions; in 1600, but 250; in 1500, but 125; in 1400, but 62.5; in 1300, but 31.25; in 1200, but 15.625; in 1100, but 7.8125; in 1000, but 3.90625; in 900, but 1.953175; and, in 800, there would not have been a single million on the whole earth, though China and India contained, perhaps, at that time, their 500 millions. The principle, therefore, is as absurd as, in the hands of the European Aristocracy, it has been insulting and mischievous.

Even if we grant the fact, that, in particular countries, prosperity may rapidly augment numbers, there is increase of produce with increase of labourers, if they are allowed to till the earth; and, as a last resort, there is emigration as a vent, if usurpations of the soil and means forbid increase of labour and produce.

Whatever be the law of *births*, there must within the generation be the same law of *deaths*. It is two parallel series;

one of which, the positive, is, we will suppose, about half a generation in advance of the other. Then assuming even the geometrical ratio, it is

+ 1, 2, 4, 8, 16, 32 Births,
— 1, 2, 4, 8, 16, 32 Deaths;

that is, the two series permit but a 0.5, or half increase, however long continued, and the result will be more evident, thus—

+ 1, 2, 4, 8, 16, 32 Births,
— 0, 1.5, 3, 6, 12, 24 Deaths.

The difference being as four to three for a generation, and the very same if continued for 1000 generations.

Length of life has no connection with the question, since nature has set a *limit* in the breeding period of women, which runs from 20 to 30 years; and this being the *natural death* of half the species, the terms 0 — 1.5 — 3, are increased in the proportion of 25, the average breeding-time to the whole term of life, perhaps at 25 to 40, or 5 to 8, while the contemporary increase in a generation is, as above, but 6 to 8. No increase above an eighth in the current generation can, therefore, take place in the gross population of the earth, and that only for one generation, since the deaths always keep even pace in a generation, and an eighth. Since 1785, the increase of personal independence and intercourse in manufactories, the introduction of vaccination, and the decrease of syphilis, may have swelled numbers merely to increase the work of death within the next fifty years.

The improvements of manufactures affording increased employment between 1780 and 1790, the population in this, as in all such cases, flowed *in the direction of employment.* This is a law between nations, or between districts and towns in the same nations. In every country where *credit* has generated capital, and capital enterprize, population has flowed to it; and it soon became as remarkable for population as for wealth. Collected masses and employment lead to early marriages as an effect of those circumstances, and not as a *new* law of nature. Other causes have concurred. The policy of government led it to endeavour to reconcile two things incompatible—high taxes, with cheap labour and cheap provisions. Every thing else, as rents, &c. rose 2, 3, or 400 per cent. but labour and provisions only 20 or 30 per cent.; farming, therefore, was depressed, and small farmers, &c. driven into towns. The system has found its limit in the absorption of farming capitals; but, in the mean time, there has been an undue increase of population.

LAND AND HOUSES.

Soils are divided into clay, clayey loams, rich loams, sandy loams, sand, peat-earth, chalk, and gravel; and in grass; each sustains particular kinds best; but in the rotation of crops each requires different succession, and demands different kinds of manure and treatment.

Soils consist of silica, lime, alumina, magnesia, oxides of iron, and animal and vegetable remains; and on the union depends fertility, for too great an excess of one renders soil barren. Bulbous and tap roots grow where sand predominates; but fibrous roots require more clay and firm substances.

Variety in the constituents of *Soil* is essential to fertility. It is barren when nineteen-twentieths are of one substance; hence lime or marl improves sand or clay.

The substances which constitute soils are certain compounds of the earths, silica, lime, alumina, magnesia, and of the oxides of iron and manganese; animal and vegetable matters in a decomposing state, and saline, acid, or alkaline combinations. To form a just idea of soils, it is necessary to conceive different rocks decomposed, or ground into parts or powder of different degrees of fineness; some of their soluble parts dissolved by water, and that water adhering to the mass, and the whole mixed with larger or smaller quantities of the remains of vegetables and animals, in different stages of decay. Soils appear to have originated from the decomposition of rocks and strata; they are often found in an unaltered state upon the rocks whence they were derived, *i. e.* soft granite, or porcelain granite. This substance has three ingredients, quartz, feldspar, and mica. The quartz is almost pure silicious earth, in a crystalline form. The feldspar and mica are very compounded substances; both contain silica, alumina, and oxide of iron; in the feldspar there is usually lime and potass; in the mica, lime and magnesia.

When a granitic rock has been long exposed to the influence of air and water, the lime and potass in its constituent parts are acted upon by water or carbonic acid; and the oxide of iron, almost always in its least oxidated state, tends to combine with more oxygen; therefore the feldspar decomposes, and likewise the mica, but the first most rapidly. The feldspar, which is the cement of the stone, forms a fine clay; the mica, partially decomposed, mixes with it as sand; and the undecomposed

quartz appears as gravel, or sand of different degrees of fineness.

Soil is more or less absorbent as it loses weight by heat. The most absorbent are aluminous or rich in vegetable or animal matter.

The portion of sand which dissolves in muriatic acid is calcareous. The remainder is silicious.

In a good turnip soil $\frac{8}{9}$ is silicious and, and in good wheat soil $\frac{3}{5}$. $\frac{11}{12}$ths of sand will produce turnips; but $\frac{19}{20}$ths of any one substance of soil renders it unproductive.

The best soils contain from 50 to 60 per cent. of silex.

The best Holkham soil contains $\frac{8}{9}$ths of sand, and the other 9th is 63 carbonate of lime, 15 silica, 11 alumina, 3 oxyde of iron, 3 moisture, and 5 vegetable matter and salts.—*Davy*.

Middlesex wheat soil contains $\frac{3}{5}$ths sand, and the other $\frac{2}{5}$ths are 28 carbonate of lime, 32 silica, 20 alumina, and 11 manure and moisture.

The absorbent power of water is a test of the goodness of soil. In a good soil, 1,000 grains dried absorb from 10 to 20 grains in an hour; but a bad soil gains only from three to eight grains.

Peat is generated by the decay of whole vegetable crops on the same spot in succession. Peat bogs are formed by fallen trees, either cut or blown down, and left on the spot. *Davy*.

Manure acts on the principle that plants require something more than pure water for their food, and actually imbibe elementary substances presented to their roots. Neither vegetable nor animals form, but imbide the earths formed in them.—*Davy*.

Fallowing does not enable the soil to absorb any thing beneficial from the atmosphere.—*Davy*.

The tillage and pasture of England are now as 975 to 1369, and the woods and waste as 860. In Wales, the tillage pasture and waste are as 19, 22, and 13.

The estimated proportion of tillage and pasturage of the 40 English counties, in 1821, was as 168 pasture to 111 tillage. In Wales, the tillage to the pasture is taken as one to three; and, in Devonshire, as one to two; but in Staffordshire as five to one; and, in Surrey, as one to five. In Cornwall the proportions are equal, and nearly so in Herefordshire, as well as in Scotland.

An acre, in provisions for cattle, yields from 9 to 10,000 lbs. of vetches and cinque-foil, 7,000 lbs. of grass, and 4,000 of hay.

In England, an Acre in various produce yields, in lbs. of food per annum, as under:—

	Per Ann.	Per Day.
Mangel Wurzel • • • •	22,000	• • 60
Parsnips • • • • • • •	11,000	• • 30
Cabbages • • • • • •	10,700	• • 30
Turnips • • • • • • •	8,240	• • 25
Potatoes • • • • • • •	8,000	• • 24
Apples • • • • • • • •	7,500	• • 24
(The two last will grow together.)		
Carrots • • • • • • • •	7,000	• • 21
Pears • • • • • • • •	5,000	• • 15½
Onions • • • • • • • •	2,800	• • 7½
Beans and Peas • • •	2,000	• • 5½
Plums, Cherries, &c. •	2,000	• • 5½
Oats • • • • • • • • •	1,840	• • 5
Barley • • • • • • • •	1,600	• • 4½
Wheat • • • • • • • •	1,250	• 3½
Mutton (Middleton) • •	224	• • $\frac{3}{5}$
Beef • • • • • • • •	186	• • ½
(Very best ditto, a third less.)		
Milk • • • • • • • • •	2,900	• • 7½
Butter • • • • • • • •	300	• • $\frac{5}{8}$
Cheese • • • • • • • •	200	• • $\frac{4}{7}$

The nutritive matter in an acre of various grasses in lbs. is as under:

Poa aquatic (flower)	.	4,945
Clover (seed)	.	4,211
Festuca elatior (flower)	.	3,988
Festuca calamaria (flower)		3,929
Holcus mollis (ditto) .	.	2,393
Bromus sterilis (ditto)		2,340
Dactylis cynosuroides (ditto)		1,898
Phalaris canariensis (ditto)		1,876
Bromus multiflorus (ditto)		1,755
Arundo colorata (ditto)	.	1,702

Other 30 species far less.—*Davy*.

An acre of good land (according to Middleton) yields, per day, 10 oz. of mutton and 8 of beef, or 228 lbs., and 182½ per annum. Hence, if rent is 2*l*., and rates and expenses 2*l*., mutton costs 4½*d*. per lb., and beef 5¼*d*. to the grazier. A man, who consumes 2 lbs. of mutton per day, eats the produce of three acres, and of beef four acres.

In the cultivation of grain in England, it was, in 1831, computed that there were about eight millions of acres in wheat, barley, rye, oats, and beans, at three quarters to the acre, and about 18 millions employed as pasture for cattle. About a million and half acres in potatoes, carrots, turnips, &c. The waste was computed at six millions of acres; and the whole surface of England and Wales is about 38 millions and a half.

The land in grain cultivation is, on various authorities, about 7½ millions of acres in England and Wales. In grasses and cattle crops 2¼ millions, in pasturage 17 millions, in gardens 50,000, in parks 250,000, in fallow 2 millions, in hedges, roads, and water ways, 1 million, in commons and waste 5½ millions.

The grain produce is on the average 3 quarters of wheat, 4 barley, and 4½ of oats. A husbel of wheat weighs from 57 to 62 lbs. and it yields 45 lbs. of flonr for wheaten, and 48½ for household bread.

Average land in England produces 25 bushels, weighing 60 lbs., per acre of wheat, or 48 lbs. of good flour, in all 1,200 lbs. of flour, which produce 365 quartern-loave to the acre. Then, as 365 quartern-loaves supply a family in bread and other flour, and there are 3½ millions of familes, this number of acres may be assigned to wheat. An acre of potatoes produces 250 bushels of 70 lbs. or 17,500 lbs. and taking one half as nutricious, we have 8,750 lbs. to the acre, or eight times the produce of wheat, so that an eighth of 3½ millions of acres would feed the same number of inhabitants, or the same number of acres would feed eight times the number of people.

Lauderdale calculated, that 9,000,000 of people, the supposed population of England, would require only 2,412,746 acres of land, on his plan of using only a vegetable diet. In that case, England would support 180,000,000 of people.

There are 33 millions of cultivated or capable acres in England and Wales, 9 in Scotland, and 16 in Ireland; in all 58 millions; and taking the families at 4 millions, nearly 15 acres to every family. Every acre will support a family on vegetable diet; bnt, in flesh and vegetables, 3 acres are required to live in plenty. The United Kingdom might therefore support 300 millions of inhabitants on vegetables, or 100 millions on flesh and vegetables, without resorting to the 20 millions of acres of uncultivated soil.

Provisions are more abundant in populous countries than in those where the inhabitants are scanty, though the soil is the most fertile in the world, as in North and South America, central Africa, &c.

The fundamental practices of good farming, in England, are draining, weeding, and manuring. The soils are argillacious, silicious, or calcareous, with vegetable remains; which, variously mingled, make up loamy, chalky, clayey, sandy, gravelly, and peaty soils. In the rotation of crops, one crop is taken for man, and another for beasts.

No soil will decrease in fertility under good management, in these climates. Duly apportioning meadow and pasture to arable land; manuring with crops ploughed in; Tullian husbandry and deep-ploughing; fallow crops for fallows, and never taking two grain crops together, will always sustain fertility.

Agriculture never rises to perfection in a merely agricultural country. It requires the stimulus and support of manufactures, and foreign trade.

Improved management has donbled our produce within a century. The average is 25 bushels to an acre; seed 2½ bushels. Mr. Coke's estate in Norfolk, and the Isle of Wight, averages 35; seed 4 bushels. Garden gronnds round London produce from 200 to 400*l.* in crops per acre, and rent from 10*l.* to 20*l.*

In Europe, generally, the laws of landed property are founded on the assumption of conquest by a chieftain, who distributed the whole as property to his followers, as FEUDAL VASSALS, in contempt of the prior natural rights of the original inhabitants.

Five millions of acres have been enclosed in the last 120 years, by about 4200 acts of parliament, at a cost of 10*l.* per acre, and about 1200 acres for each bill. In general, the interests of the poor are neglected, and these acts served very often to increase the monopoly of land.

A farm in England, of 400 acres, let at 20*s.* per acre, will require, to cultivate it well, that the farmer should have a capital of 3000*l.* sterling; to consist in waggons, carts, wheelbarrows, ploughs, harrows, drills, horsehoes, and other implements, and money; besides horses, cattle, pigs, &c.

One hundred acres manured yearly, at 6*l.* per acre.

Subsistence for himself, family, and servants; and farm servants' wages for one year.

Such a farm ought to produce five rents, viz:

The landlord's rent	£400
Profit on capital employed . . .	300
Expences of annual manuring .	600
Expences of cultivating the crop, tithes, taxes, poor-rates, wear and tear of implements, &c. .	700
	£2000

Mr. Hamilton shows, that, on new enclosures, the cost per acre of the first crop of wheat is 6*l.* 14*s.* 6*d.*, the produce of 18 bushels but 7*l.* 4*s.*, and the tithe 14*s.* 6*d.*; leaving the farmer minus 4*s.* 10*d.* That a second crop of barley costs 3*l.* 16*s.*, prodncing, for 25 bushels, 5*s.*; on which the tithe is 10*s.*, leaving but 14*s.* profit. And that the third crop, potatoes, costs 12*l.* 11*s.* 2*d.*, producing 100 bags at 3*s.*, the tithe being 1*l.* 10*s.*, leaving but 1*l.* 12*s.* 10*d.* on the three crops; and without including rent, or taxes, or risk of crops.

The number of Enclosure Bills are found to have been as follows, in periods of five years—

Years.	Number.	Years.	Number.
1805	454	1820	211
1810	452	1825	74
1815	560	1830	102
	1466		387

It is computed that there are, in England and Wales, above five millions of oxen, 32 millions of sheep, and about one and seven-eighths million horses, one-fifth of which are kept for pleasure. The annual produce of wool is about 83 million lbs.; but it is become of secondary value, owing to the superiority of Saxony wool for cloth-making.

The chief breeds of cattle, in England, are the short-horned, long-horned, the Devonshire, the Galloway, the Welsh, and the Highland. The principal breeds of sheep are the South-down, the Norfolk, the Leicestershire, the Welsh, the Cheviot, and the Merino.

The agricultural horses are about 70,000, and the travelling and pleasure-horses nearly two millions, consuming the produce of six and a quarter millions of land in grass and oats.

There are about 1,700,000 horses in Great Britain. Those in stage-coaches in 1828, per tax-office, were 16,000, or about two horses for every three miles of turnpike-road. The race-horses were 780, and the mules 481. 1099 persons paid on 20 and upwards.

In five late years the French imported 81,104 horses, &c. from England.

Manure owes its stimulating power to salts of ammonia, or volatile alkali. Human soil affords three times as much as that of any animal.

Animal manure is found to blast wheat, and so to affect pastures as to render flesh unwholesome.

Bone manure requires from 25 to 40 bushels to the acre.

Human bones are imported from Germany, ground in Yorkshire, and applied as manure to the land.

Number of Cattle, and Prices of Meat per Stone of 8 lbs. in Smithfield.

Year.	Beasts.	Sheep.
1822	142,043	1,340,160
1828	147,698	1,288,460
1830	159,907	1,287,070

Year.	Beef.	Mutton.
1828	3*s.* 5*d.* to 4*s.* 5*d.*	3*s.* 9*d.* to 4*s.* 0*d.*
1829	3 $2\frac{1}{2}$ to 4 2	3 4 to 4 6
1830	2 $11\frac{1}{2}$ to 3 $11\frac{1}{2}$	3 $0\frac{1}{2}$ to 4 $3\frac{1}{2}$

In spite of disadvantages of climate, agriculture is conducted in Scotland on more scientific principles than in England; and the rapid improvements of late years are ascribed to the currency of 1*l.* notes, which the wily Scotch retained when they were stopt in England. English farmers are therefore without capital in currency or credit, for improvements of any kind.

England and Wales have 37,084,000 acres of superfices, of which about $10\frac{3}{4}$ are in tillage, 16 in pasture, and 10 in wood and waste. In 1815, the total rental was 29,476,856*l.*, which, on the tillage and pasture, was abont 23*s.* per acre, and on all not 16*s.* The poor-rates and other direct assessments were $12\frac{1}{2}$ millions.

The annual profits of the land of the United Kingdom are taken by Marshall at 160 millions; and this is the fundamental item of our national wealth. The next item is machinery, which enables us to draw on the natural produce of other nations for another 30 or 40 millions.

Marshall estimates the annual produce of the soil of Great Britain to be 160 millions; and this he distributes as under:

Subsistence of producers . . .	25
Rental	40
Wages of servants	$4\frac{1}{2}$
Day-labourer	$26\frac{1}{2}$
Parochial assessments	$5\frac{1}{2}$
Tithes	4
Artisans and mechanics . . .	12
Profits for luxuries	$43\frac{1}{2}$
	160
Imports in exchange for exports	45

Which 205 millions constitute the sum-total of our profitable transactions, however they may be variegated and multiplied, by wholesale and retail dealing, or disguised by artifices of banking, fictions of money, &c.

The rentals of houses assessed to the house-tax, in England and Wales, and rated at 10*l.* and upwards, is 11,154,109*l.* on 378,786 houses. True returns would make the amount double, and the houses at least 600,000.

800 acres of hunting ground produce only the food of half an acre in arable cultivation.

Rye is the bread corn of Russia, Germany, &c.

Mr. Middleton found the soil of London-privies the best manure; and he inferred, that 2 loads per acre per annum would keep land in the highest state of production. Peat ashes, coal ashes, wood ashes, malt dust, soot, soap-maker's waste, were of little effect. Street sweepings and night soil were the best.

Mr. Bevan shews that the resistance, on a loose sandy road, is as 204; on a gravel road, 143; on a dry turf, 40; on a dirty turnpike, 39; and on a clean M'Adamized turnpike, 30. In horses, as 7, 5, $1\frac{1}{3}$, and 1.

Wells, dug on the sea-shore, above the high-water mark, to the depth of the low-water mark, fill with fresh water as the tide ascends.

The Middlesex milk-cows give nine quarts per day, and about 10,000 supply London.

Muriatic acid curdles milk better than rennet, and preserves it from mites.

Eggs are kept fresh for years, in Scotland, by rubbing them with oil or butter, when newly laid, so as to stop the pores.

The argali, or mountain sheep, is believed to be the savage stock, whence the domestic sheep is descended. It differs as much as the wild boar from the hog, being as high as the deer, with the habits and manners of the wild goat, and large twisted horns.

Clayey sub-soils and strata render a country subject to fevers and fogs. Strata which receive water have different results.

Bevan determined, by levelling, that Tring, in Hertfordshire, is 402 feet above the level of low water, and Arbury Hill 740.5.

Spain, like many other countries, is ruined by the ignorant meddling with nature. The selfish Spaniards, in Castile and Leon, to deprive the birds of shelter, have cut down all the trees, and, in consequence, no rain falls, and the whole country has become desert. Clouds require the spiculæ of leaves to act on their electricity.

Irish lean cattle are sent to all the ports of the western coasts of England, Bristol channel, &c. to be fed by English graziers. Their fat cattle are slaughtered to victual the English ships of war and merchant-ships; their butter, tallow, skins, are in great part exported; and the money arising from all these articles sent to the absentees and others, for rent and tithes. Thus the inhabitants of the country are almost wholly deprived of the produce of the land they inhabit; and they live, if they can be said to live, on a very small part of it, by raising potatoes, in corners of fields and other small unoccupied places.

It is estimated that three agricultural families may support two artizan or trading families, in all the varieties of social employment, from the learned professions down to the blacksmith and carpenter, or as three agricultural to two of all other descriptions. But, by the returns of 1821, the entire agricultural population of Great Britain were 978,656 families employed in agriculture, including agricultural trades, to the number of 50,000: while the dealers and traders were 415,507; the manufacturers 924,432, and the unproductive families, who lived on the others, were 612,488; making the proportions nine to twenty, instead of nine to six or three to two. Hence, 1,400,000 families, or half the population, are in an artificial state, depending on exports and imports, on fashion, shifts, and contingencies.

A colony of 100 agricultural families ought, in due proportion, to consist of sixty-six of other classes, as, one priest, two lawyers, four medical men, four school-masters, six tailors, eight carpenters, five smiths, three braziers, two cabinet-makers, four brewers, &c.; fourteen manufacturers, ten traders, or interchangers, and three clerks or accountants; and, as it is with a colony, so it ought to be in nations, while the annual gains of each ought to be nearly equal.

The price of provisions, in towns, is from 30 to 50 per cent. above that of the country, according to size. *Allnutt.*

The average consumption of the British population per week is, or ought to be, a quartern-loaf, ten ounces of butter, eight ounces of cheese, four lbs. of flesh, six lbs. of vegetables, one quart of milk, two quarts of beer, &c.; half a lb. of sugar, two ounces of tea or coffee, half a lb. of candles, one bushel of coals, half a lb. of soap, and 1*s.* of sundries, costing, in 1832, about 8*s.* each, or 21*l.* per annum, besides house-rent, 2*l.* 10*s.*, and 5*l.* for clothing, in all, 28*l.* 10*s.* Five may live together for 100*l.*, and yet we hear of board and education at 15 or 10 guineas, and of manufacturers, &c. getting but 6*d.* per day. 25*l.* for 22 millions of people bespeaks an annual expenditure of 550 millions.

The annual value of the real property of England, as assessed to the property-tax in 1814-15, was 51,898,423*l.*

The total expenditure of money, for the year ending the 25th of March, 1827, for local purposes, as highway-rates, church-rates, relief of the poor, county-rates, constables' charges, militia, and other incidental expenses, amounted to 9,489,687*l.*

The property-tax of 1811 gave, as the rental of the 37 millions acres of land in England and Wales, 29,476,856*l.*

From Lady-day, 1826, to 1827, the highway-rates (over and above tolls) were, in England and Wales, 1,121,834*l.*; the church-rates (over and above tithes, Easter dues, fees, &c.) were 564,388*l.*; and the poor-rates and county-rates 7,803,465*l.*; in all, 9,489,687*l.* on an income from real property, which, in 1815, was 51,898,423*l.*, but reduced by the panic to at most 40 millions. These local taxes are a full fourth of the income on real property, without considering tithes, &c.

The scale of the rent of land is form-

ed from that of the poorest, and it is the tendency and object of the Corn Laws to keep up the price of poor lands.

Mr. Beaumont estimates the government, church, and local taxes at 76,000,000*l.* and the whole rental of real property as scarcely more than the returns of 1804, namely, 38,000,000*l.* He supposes that not more than five millions of men in the twenty millions are employed in productive industry; and taking the annual earnings of the productive labourers of the United Kiogdom at 87,250,000*l.* sterling, those who live on the taxes and tithes absorb nearly as much as the whole of the value of the industry of those who work.

The rental of the cultivated land, in 1815, was about fifty millions, or two guineas per acre. And as the land-tax, at a fifth, produced but two millions, rents had risen fivefold in 120 years, of which it had been fourfold within the previous thirty years, by which land-owners had indemnified themselves against taxes to the amount of thirty millions, and, since 1693, of forty millions. Produce but 20 per cent. more.

The total rental of land and houses, in 1825, in the United Kingdom, was 112 millions, *i. e.* 77 for England and Wales on thirty millions of acres, and two of houses; 10 for Scotland, on five million acres, and one-third houses; and 25 for Ireland, on sixteen million acres, and one and a quarter houses. But, in 1830, it was reduced a third, or to 71 millions, and is still lowering. The fee simple, at eighteen years' purchase, would be 1,350 millions; but the mortgages are estimated at 600 millions; besides the public debt and fixed assessments.

The Marquis of Stafford takes his rents in the value of coro. In 1827, he abated 31 per cent.; and, in 1828, 26 per cent. In Scotland, he receives in the value of wool and sheep; and, in 1827, he abated 29½ per cent.; and, in 1828, 31 per cent.

Betweeo 1786 and 1820, half a million of houses, and cottages attached to small farms, were destroyed; and the land, for higher rents, was merged into the large farms of speculating farmers.

The total number of houses in England and Wales, above 10*l.* rent, is 378,786. Of these, 116,279 are in London and Middlesex; and, of the 438 rated above 400*l.*, 410 are in the same; of 551 at 300*l.*, 487; and, of 1925 rated from 200*l.* to 300*l.* 1643 are in the same. Surrey, a metropolitan county, gives 223, and 72 of each. The rental of all is 11,154,109*l.*; that of the metropolis being 5,916,106*l.*, or above half.

The returned number of houses, exempt from house-tax, as farms, is, for England and Wales, 139,000.

Of the 2,880,156 houses returned, in 1821, as inhabited, only 437,626 were assessed for the house-duty. The remainder consisted of 202,628 farm-houses, and as such exempted from duty; and the other 1,446,002 were too poor to pay.

3527 in England were rated at above 160*l.* per annum, of which there were 2370 in London and Westminster, and 671 in Middlesex, exclusive of London; but none such in Wales, and not one in Norfolk, Lincolnshire, Suffolk, Cornwall, Durham, Shropshire, Northamptonshire, Cumberland, Monmouth, Herefordshire, Westmoreland, Huntingdon, and Rutlaod: 175 were so rated in Surrey, 106 in Somerset, 41 in Lancashire, 35 in Kent, 32 io Gloucestershire, and 14 in Sussex. Yorkshire gave but 14, Suffolk, Durham, Hereford, Monmouth, and Huntiogdon, had not one above 110*l.*

230,000 houses have 10 windows and upwards, 5100 above 50, and 660,000 only 7 and under.

In Middlesex, a three-farthing rate, in 1830, produced 16,776*l.* 5*s.* 6*d.*, proving the reotals to be 5,368,408*l.*

By the returns of 1821 it appeared that in Middlesex there were 7327 uninhabited houses, yet 2879 building; and, in Lancashire, 5759, yet 1735 building. In the last three years there have been 12,000 empty houses in Middlesex, or one-fourteenth of the whole, and yet, in the same time, 6000 have been built. In the winter of 1829, the empty houses in Middlesex were one-tenth of the whole, yet speculative builders were raising new streets to create capital?

Houses that pay Assessed Taxes, in the Seven Metropolitan Electoral Dstricts:—

DISTRICTS.	Population in 1831.	Houses in 1821.	Assessed at 10*l.*	Assessed at 20*l.*	Amount Assessed.
4 London City......	123,258	29,068	13,600	1,888	£198,101
2 Westminster......	202,050	41,554	17,681	15,163	303,428
2 Finsbury	244,077	49,606	23,626	1,748	206,846
2 Tower Hamlets...	359,821	69,377	26,297	13,467	118,548
2 Mary-le-bonne ...	240,294	40,346	22,637	19,618	206,844
2 Lambeth	203,229	34,263	16,872	9,224	108,811
2 Greenwich	62,009	13,229	4,177	1,573	21,341
16 Members	1,434,738	277,443	124,890	62,681	1,163,919

In 1832, the houses are about 300,000 in the seven districts, which extend a trifle beyond the usual bounds of the metropolis.

House-rent, in the United Kingdom, in forty years, from 1780 to 1825, was quadrupled; and, in 1825, in general, stood mortgaged for double the rental in 1780. If, in 1780, rent averaged 8*l*., in 1825 it averaged 32*l*., making a rental on three millions of houses of ninety-six millions, and a probable mortgage of forty-eight millions.

The 50 millions of acres of land, in 1780, let for 40 millions; but, in 1825, at 100 millions, with mortgages for 50 millions interest.

Hence the houses in 1780, at 12 years purchase, were worth 96 millions, and the land, at 20 years, 800 millions; but, in 1825, the houses were worth 384 millions, and the land worth 2000 millions. Hence the mortgages were, on houses, 192 millions, and on land 1000 millions, and in 1832 are not less. Houses and land have since fallen 20 per cent. and the fall to a gold price threatens to approximate the prices of 1780, or half the amount of the sums borrowed on mortgage in a reasonable confidence in the prudence and stability of public policy.

The coast of England and Wales are officially considered as about 2,000 miles, Scotland as 1,100, and Ireland as 1,300.

The coasts of England present high cliffs only in Cornwall, Wales, Kent, and Norfolk.

In 1823, the turnpike-roads were 24,531 miles in Great Britain, the income 1,214,716*l*. and the debts 5,200,000*l*. *i. e.* 220*l*. per mile. The total canals 2,589 miles.

The Counties of England, which contain above a million of acres, are as under—

Yorkshire (W. R.)	1,568,000
Ditto (N. R.)	1,311 187
Ditto (E. R.)	819,200
Lincolnshire	1,758,720
Devonshire	1,650,560
Norfolk	1,338,880
Northumberland	1,197,440
Lancashire	1,171,840
Somersetshire	1,050,080
Hampshire	1,041,920

Essex, Kent, Suffolk, Sussex, and Cumberland, contain between 900,000 and a million of acres. Wiltshire, Shropshire, Cornwall, and Gloucestershire, contain from 800 to 900,000 acres.

The smallest Counties are as under, in Acres:—

Rutland	95,360	Bedford	296,320
Middlesex	180,486	Monmouth	318,720
Huntingdon	236,800	Hertford	337,920

Many of the counties of England are mentioned before the extinction of the Saxony heptarchy; and, therefore, this division was not made by Alfred. Tacitus describes the Hundred-court in his work on the Germans; and the Saxons appear to have transferred it to England for every 100 or 120 householders. Some Hundreds do not contain a square mile; and, in Lancashire, some 300; which has led to the union of small ones, and the separation of large ones into divisions. In Wales, they were called Cantrefs and Commots. In the northern counties they are called Wards and Wapentakes. In Kent, Lathes; and, in Sussex, Rapes. The parishes were originally of the same extent as the manors, and the lord appointed the clergyman. In the north, parishes often contain 30 or 40 square miles, and are seven or eight times the size of those in the south.

The Lakes in Cumberland are Derwent-water, near Keswick, and Ullswater. The former is from three to four miles long, and one to two broad. The mountains in its neighbourhood, including Skidaw, give it so celebrated a picturesque character. The latter is nine miles long and one broad, and thought more picturesque than the former. The vicinity is very rich in minerals of all kinds. At Borrodaile is a famous black-lead mine. Near Kirkoswald there is an arrangement of large upright stones, above 60 in number, after the manner of those at Abury, but not so large.

The Fens, in Cambridgeshire, &c. amount to 350,000 acres, and are an extension of the gulf called the Wash. The tract has been drained by canals, and latterly steam-engines have been applied with great success. It was a woody district 500 years ago, and the sea, which then rose, appears now to be on the retreat nearly on the whole eastern coast.

The number of parishes, in England, is 9,800; in Wales, 833; and, in Scotland, 948 respectively, in 42, 12, and 32 counties. In Ireland, there are 32 counties in 294 baronies; and, according to Wakefield, 20½ millions of acres; and, to Beaufort, 19½.

The Antipodes of England lie to the south-east of New Zealand; and near the spot is a small island, called Antipodes Island.

Japan is called the Britain of the Indian seas.

The French call the English channel La Manche, from its resemblance to a sleeve.

Ireland is 3¾ degrees of latitude, or 259 miles long, taken from Cork-head to Malin; and 2¼ degrees wide, or 155 miles wide, taken from Dublin to Ballynahinch. Hence it contains 40,000 square miles, and about 25 millions of English acres, divided into 32 counties,

of which Cork, the largest, contains one-eleventh, and Louth, the least, only one-hundredth. Cork, in the south, is 115 miles from Dublin; Castlebar, in the west, is 114; and Londonderry, in the north, 164 miles; and Dublin itself is in 53° 23′, north lat. The Bogs are 2½ millions, and run from near Dublin, expanding to the Atlantic. The Shannon is 170 miles long, and navigable to Limerick. The Hill of Macgillicuddy is 3,695 feet. The Bog of Allan is 65,000 acres, and 270 feet above the level of the sea. There are three lakes at Killarney, of 3,000 acres, 640, and 720. The Grand Canal runs from Dublin to the Shannon. The Newry-canal admits vessels of 60 tons, and joins Loch Neagh, of 58,000 acres. Cork harbour is one of the best and most spacious in Europe.

Killarney Lakes have, in beauty, no rival, says Arthur Young. The extent of Loch Earne is much greater, the islands more numerous, and some scenes near Castle Caldwell of perhaps as great magnificence. The rocks, at Keswick, are more sublime; but the prodigious woods of Killarney—the immensity of the mountains—the uncommon beauty of the promontory of Mucross, and the Isle of Innisfallen—the character of the islands—the Arbutus, and the uncommon echoes—render them, on the whole, superior to all comparison.

Fairhead, the Promontory of Antrim, in lat. 55° 44′, and long. 6° 2′, is 545 feet high. It consists of 200 feet of green stone, resting on strata of sand-stone, and resembling basalt, being but 8 miles from the Giant's causeway of basalt.

Albany, north of Argyle, is the highest part of Scotland, and is supposed to have derived its name from *Album* or *Alpum*, high; and hence *Albion* and *Albany*.

Distances of Principal Towns from London:—

	Miles.		Miles.
Aberystwith .	211	Coventry . .	91
Alnwick . .	308	Croydon . .	9
Bangor . .	236	Devizes . .	89
Bath . . .	106	Doncaster .	162
Bedford . .	50	Dorchester .	119
Birmingham	109	Dover . . .	71
Brighton . .	51	Dumfries . .	336
Bristol . .	118	Edinburgh 395,	466
Buckingham	58	Exeter . . .	171
Bury St. Edm.	71	Falmouth . .	269
Caermarthen	218	Gloucester .	104
Cambridge .	50	Glasgow . .	396
Carlisle . .	301	Guildford .	29
Chatham . .	30	Halifax . .	197
Chelmsford .	29	Hertford . .	21
Cheltenham .	94	Holyhead .	267
Chester . .	183	Hull . . .	174
Chichester .	62	Huntingdon .	59
Culchester .	51	Ipswich . .	69
Kendall . .	262	Poole . . .	103
Lancaster .	214	Portsmouth .	72
Leicester . .	96	Preston . .	217
Leeds . . .	189	Ramsgate .	71
Lincoln . .	132	Reading . .	38
Liverpool . .	206	Rochester .	29
Lynn . . .	102	Salisbury . .	81
Maidstone .	34	Scarborough	217
Manchester .	182	Sheffield . .	162
Merther Tydvil	176	Shrewsbury .	153
Milford . .	258	Southampton	74
Montgomery	168	Stafford . .	141
Newcastle-under-Line . . .	150	Stamford . .	89
		Stratford . .	93
Ditto upon-Tyne . . .	274	Taunton . .	141
		Tenby . . .	261
Newmarket .	61	Tunbridge-wells	36
Northampton	66	Wells . . .	120
Norwich . .	108	Weymouth .	128
Nottingham .	124	Whitehaven .	294
Oakham . .	95	Winchester .	62
Oxford . .	54	Windsor . .	22
Penzance . .	281	Worcester .	111
Peterborough	81	Yarmouth .	124
Plymouth .	216	York . . .	199

The devious route of English roads is proved by the facts that, in a straight line, York is but 173 miles from London, instead of 190 road-measure; Liverpool but 173, instead of 206; Birmingham but 98, instead of 109; and Bath but 98, instead of 106. The difference being 10 miles for 9, and 7 for 6, averaging 8 for 7.

The longest mail-coach distance is to Thurso, 783 miles. It starts at 8 in the evening, reaches Thirsk, 219 miles, at 40 min. past eight the next evening; Queen's Ferry, 413 miles, ½ before 8 the second evening; Nairn, 623 miles, at 7 min. after 8, the third evening; and arrives at Thurso at 20 min. after 10, the fourth evening. In 261 miles to Holyhead, it arrives at Capel Carig, 222 miles, on the next evening, at 8; and, at Holyhead, at 6 min. after 12.

The London and Holyhead New-road, in 15 years, cost 743,423*l*. The Menai-bridge and New-road, in Anglesea alone, cost 273,826*l*.

The exact distance from the Post-offices of London and Bristol has been ascertained to be 121 miles, 1 furlong, 25 poles, 29 yards, 1 foot, .85 links.

14,603,473 statute acres are under cultivation in Ireland, of which one million have been tithe-free.

There are about five millions of acres of waste land in Ireland. The county-rates are 800,000*l*.

Under fair management in Ireland, spade-squares of potatoes weigh 19 lbs. per spade, or 108 barrels per acre, each barrel 252 lbs. or 36,000 lbs. to the acre, or 100 lbs. per day on an acre.

285 tons 11 cwt. of turnips were a

single crop of turnips on an Irish acre in 1829.

An acre of potatoes, in Ireland, yields 82 barrels, of 20 stone, or 22,960 lbs.; and an acre of wheat yields four quarters of 460 lbs., or 1840 lbs.; then, if wheat goes three times as far as potatoes, and is equal to 5520, the potatoe crop gives four times more subsistence than wheat.

Potatoes, in 1828, were sold, in Ireland, at 3*d* the cwt., and 4*s*. a ton.

The export of Irish butter is about 20,000 tons, and 120,000 barrels of beef; besides 130,000 barrels of pork, bacon, and hams. The linen is 20,000 boxes; in all, about 1,080,000 pieces, of 25 yards, at 50*s*. per piece on the average. Of whiskey, they make from five to six millions of gallons.

One hundred thousand Irish labourers visit England, from March till October, to perform agricultural labour on large farms, which, having engrossed small ones, leave tracts and parishes without adequate local population.

Cheshire cheese owes its quality to the excellence of the soil, to the size of the dairy-farms, and the great number of cows kept on them, and to the accurate system of the manufacture. Some dairy-farmers have from 3 to 400 cows, each yielding eight quarts of milk; from which is made one lb. of cheese, or for every 16 ounces of milk one ounce of cheese, being the produce of a cow per day. The cheeses, therefore, are very large, running from half cwt. to one and two cwt.; and single cheeses have been made equal to five or six cwt.

In making cheese, it is customary to put two cups of rennet to about 25 gallons of milk, at a heat of 100°, and the curd comes within two hours. Cheese is a very ancient product. It is mentioned in Job and in Samuel, and by Homer and Hippocrates. England makes cheese which is sought after all over the continent. Muriatic acid, and several herbs, are superior to rennet, and used in Holland, &c.

One thousand two hundred tons of cheese are made annually in and round Cheshire.

Honey was used, instead of sugar, till the 15th century; and beverages were made of it, called Mead, Metheglin, Pigment, and Moret.

Hop grounds let from 10*l*. to 12*l*. per acre; and osier beds at the same.

The largest coal-fields of England are

1. In Durham and Northumberland, from Standrop to near Berwick; and from Brampton to Belford.

2. In Yorkshire, from Leeds and Birstall, to Nottingham and Derby.

3. In South Wales, from Pontipool to Kidwelly; and from Langhorne to near St. David's.

4. In Lancashire, from Colne to Prescot and Oldham.

The Beaumont seam, east of Newcastle, is 213 fathoms deep, and two feet ten inches thick. Other seams are from 150 to 185. The seams being 35 feet in 213 fathoms. In other districts there are 29 feet in 130 fathoms, and 28 in 78 fathoms.

The average weight of Newcastle coals is about 79 lbs. per cubic foot, and the specific gravity 1.264, nearly.

In 1780, the London consumption was 657,302 chaldrons: in 1801, 836,971; in 1820, 1,327,825, in 5922 ships; and in 1829, 1,593,581 of 27 cwt.

The coal formations, in England, are extensive in Northumberland and Durham, Nottinghamshire, and West Riding of Yorkshire, Lancashire, and South Wales. There are patches in Cumberland, Flintshire, Staffordshire, Shropshire, Gloucestershire, Somersetshire, and Monmouthshire. The largest is that from Nottingham and Retford, extending beyond Leeds. That in Northumberland is of nearly equal superficies. The south-west of Scotland, Cumberland, part of Man, Wales, and Cornwall, are slates. Hereford and Monmouth is old red sand-stone. From Chester, to Lancashire and Cheltenham, is new red sand-stone. The London clay extends from Reading to near Harwich and Sheppy.

On the authority of Mr. Taylor, coal-agent for the Duke of Northumberland, the extent of the known coal-fields in Northumberland and Durham alone, is 723 square miles. Estimating the workable strata at an average thickness of 12 feet, the contents of one square mile will be 12,390,000 tons, and of 732 square miles, 9,069,480,000 tons: deduct one-third part for loss by small coal, interceptions by dikes, and other interruptions, 3,023,160,000; there remain 6,046,320,000 tons—which are adequate to supply the present sales from Newcastle, Sunderland, Hartley, Blyth, and Stockton, of 3,500,000 tons, for a period of 1727 years. And Mr. Bakewell, in his geology, calculates that the coal in South Wales alone would supply all England 2000 years, at the present rate of consumption. The total annual produce of Great Britain and Ireland is estimated at 15,580,000 tons.

The difference of subsistence between the French and English appears by the fact, that in France the arable is to the pasture land as fifty to thirteen, but in England, as thirty-four to forty-two.

The farms in France are small, running from twenty to fifty or sixty acres, and hence the mass of the people are

comfortable and well provided for. Wood being the fuel of France, fifteen or sixteen millions of acres are occupied by woods and forests.

Good land, in the United States, produces fifty bushels of Indian corn.

An average crop of cotton, in South Carolina and Georgia, is 500 lbs. or 125 lbs. of clean cotton per acre; but owing to the heats, the labour is performed by negroes.

In Carolina, the lives of slaves are insured at 10 dollars per annum, on a slave of 21. Professor Cooper asserts that, of all labour, slave labour is the dearest. Up to fifteen, he is all expence; from fifteen to twenty-one he pays his expences; and at twenty-one his cost has been 500 dollars. His earnings are two-thirds that of a white man, and his food, &c. costs forty dollars per annum. The risk is ten per cent., making ninety dollars, and then, at the same rate, white labourers may be hired. The food of a negro is nine quarts of corn and three lbs. of salt-pork per week, besides clothing, &c. thirty dollars per annum.

ARTHUR YOUNG had the great merit of drawing public attention to the capabilities of land improvements, about 1770. His Tours, Farmers' Kalendar, Annals, &c. aroused the attention of proprietary; societies were, in consequence, originated, and vast improvements made in cultivation and in stocks. ROBERT BAKEWELL proved, in 1780, that we might even controul nature in the forms of animals; and many machinists showed, that mechanical power might be applied in threshing, winnowing, dibbling, &c. while even the ancient plough underwent many great improvements. Draining was reduced to a science by ELKINGTON, and road-making by M'ADAM. In 1790, Sir JOHN SINCLAIR was placed at the head of a Board of Agriculture, and all that zeal could do, was done by him and others.

The income and property taxes, in 1801 and 1812, were a loose approximation to the annual profits of the nation, but in general much under-rated. In 1812, the assessments on the land were on 37,606,347*l.* in Great Britain; on houses, 15,534,499*l.*; and on tithes 2,583,687*l.* at 10 per cent.

But, according to rents, the land and houses were assessed, in 1803, only at 38,691,394*l.* of income, and in 1812, as above, at 53,200,846*l.*

In 1831, 378,786 houses were assessed to the house-tax at rentals of 11,154,109*l.* and only 136,104 were exempt as farm-houses, being an apparent reduction of 120,000 farm-houses within 25 years; but, such houses rated below 10*l.* are not included in the returns.

LANDLORDS have a share of the usufruct of land, but it is a species of necessary property, which can be allowed to be held only in subserviency to the public welfare. A great proprietor cannot be justified in keeping large tracts waste, nor in tenure destructive of the population.

The first steps towards cultivation in any country are cutting down large woods, draining marshes, breaking up the surface to admit moisture and heat, and sheltering the land by enclosures and hedge-rows. Such practices diminish the range of the thermometer.

Much rain is favourable only to crops on sandy, gravelly, or dry land. From 24 to 30 inches per ann., suit best the average of land, with the 3 or 5 of dew.

The heat necessary to productive vegetation is accumulated by the soil.

Sandy soils yield turnips, potatoes, carrots, barley, peas, and grasses.

Gravelly soils, if dry, are warm, and yield barley, tares, peas, and oats. With much rain, potatoes. Very poor are fit only for woods.

Clay soils are expensive, but they produce beans, wheat, oats, clover, swedish turnips, and crops of hay.

Peat soils improved yield oats, beans, root crops, and clovers.

Chalky soils yield peas, turnips, barley, clover, and wheat.

Alluvial soils, either marine or river, yield wheat, barley, oats, beans, and clover.

Loam soils. (less tenacious than clay, and more so than sand,) a mixture of all, produce every kind of produce, but 2 white crops should not be taken in succession. The hazel loam is most fertile. Others are sandy, gravelly, clayey, chalky, or peaty.

Black soils rise in the sun from 65 to 88°. Chalky only from 65 to 69°. One colour is best.

In arable cultivation, every acre of land costs the farmer from 7 or 8*l.*, and it yields from 8 to 9*l.*, at usual market-price, after all expences. Pasture-land costs less, and yields less.

Every 60 quarters of grain employs one extra hand, so that a million employs 16,600 labourers more than pasture.

Marshall estimates the cultivated land of England and Wales as 26½, (16 pasture and 10½ arable,) and of Scotland at 5½ millions. The waste in England and Wales at 10 millions, and in Scotland at 14 millions. He estimates the farms at 250 thousand in Great Britain. Then, if the cultivated land is 32 millions of acres, this averages farms at 128 acres. He then assigns three labouring families to each farm, so that only a third of the population, and a fourth of the families live on and by the land.

POOR AND POOR-LAWS.

The assessments in favour of the poor have risen, since 1748, from 600,000 to 7 or 8 millions; but it is computed, that the profits arising to the rich, from the use of machinery and the rise in rents, amount to 50 or 60 millions, or eight times more than is assessed to reimburse those who formerly performed the labour of machinery and lived on the land.

The progress of the assessment for the poor in England and Wales, according to Marshall's Tables, has been as under:

	Sum assessed.	Sum expended.	Price of Wheat.	
1750	730,125	689,971	27	11
1776	1,721,316	1,521,732	48	4
1785	2,167,748	1,912,241	49	9
1803	5,318,204	4,077,891	63	2
1813	8,646,841	6,676,105	128	8
1819	9,320,440	7,890,148	90	7
1826	6,965,051	5,928,504	64	4
1830	8,161,281	6,829,052	65	6

That poverty is the chief cause of crime, is proved by the fact, that, in 1805, the whole commitments were 3950; in 1813, 1764; in 1819, 14,274; in 1826, 17,921; and, in 1830, in spite of canting, Methodism, and police, the commitments were 18,675.

The poor's rates, from Lady-day, 1829, to 1830, amounted, for England, to 6,553,443*l.*, and in Wales to 275,591*l.*

The poor-laws were nearly the last act of the reign of Elizabeth, and, if kindly and liberally administered, they would protect all those who are the victims of misfortune, craft, and oppression, from want. But overseers, too commonly, consider the praises of the rich, for small assessments, more than the blessings of the poor; and they make no distinction between the unfortunate and respectable, and the idle and vicious poor.

The act of Elizabeth also directs provision for the impotent and aged, *but this is neglected*, and no better provision is made for *virtuous age* than for the idle and vicious. Every parish ought to have a distinct asylum for old age. The obligation to maintain the poor arises from the low rate of wages of all labour, and the introduction of machinery, to supersede labour, by which, eight times as much is saved to wealth as has hitherto been returned to the poor. The rights of the poor are coeval with the rights of property, for land, like light and air, is the original right of all the inhabitants; and if an exclusive right is asserted by one class, it should not be to the utter destruction of the excluded.

Paupers in Lambeth workhouse cost 4*s.* 10½*d.* each, per week; in Whitechapel, 2*s.* 9½*d.*; Shoreditch, by contract, 3*s.* 7*d.*

The habitations of the poor in Ireland are only a cabin, with a cabbage garden, and the size is usually enough for a hundred plants. Their rent for it is 20*s.* They live the year through upon potatoes, and for half the year have nothing but water with them; they all have a pig, and some of them several, and kill one for themselves at Christmas. All the poor people are the descendants of the old families, who once possessed the country, of which they still preserve the memory, insomuch, that a gentleman's labourer will regularly leave to his son, by will, his master's estate. Building a common cabin is 5*l.* or two of stone, &c. 31*l.* 10*s.*

The poor, in general, consider a workhouse and a prison as synonymous. There is, in England, no distinct liberal provision for old age. Poverty, therefore, begets desperation; and desperation begets crime. Punishment has, therefore, no terrors, and a change of system is loudly demanded.

The state of the poor, in Ireland, is miserable, says Arthur Young, owing to land being let to land-pirates, who offer the highest rent; and, to pay this rent, re-let all the cabin-lands at an extravagant rise. The farmers, again, are enabled to make the price of labour as *low* as they please, and rate the land as *high* as they please; for the farmer pays 4*d.* or 5*d.* a day in land, rated much above its value.

In 1822, when subscriptions were raised in England, to relieve a famine, by which thousands perished in Ireland, there were exported from Ireland 387,973 quarters of wheat, and 565,612 quarters of oats, 343,719 cwts. of flour, 175,500 cwts. of pork, &c. 55,615 sheep, and 65,037 pigs, to meet the demands of absentee landlords!

As to the *cause* of the labourer's destitute condition—his being underpaid for his regular work, and thereby compelled to apply to the poor-rates—we have a just elucidation by Macqueen:

"I will assume that the value of one-fifth of a quarter of wheat, or 102 pints, be the fair equivalent of weekly wages for an agricultural labourer. Then, in 1742, the average price of wheat being 29*s.* 6*d.* per quarter, at this estimate, the fair rate of weekly wages should be 6*s.* Now we find that 6*s.* were the average wages for that year; consequently, the relative proportion was kept up, and the poor's rates next to nothing. In the year 1790, the price of wheat was 53*s.* per quarter: but the average rate of wages, instead of being, to preserve the proportion, 10*s.* 6*d.* per week, was only 1*s.*, leaving a deficiency of 2*s.* 6*d.* or one-fourth. In 1801, wheat being 115*s.* 4*d.*, wages ought to have reached

23s., whereas they only averaged 10s.; and, in 1812, with wheat at 122s. 8d., wages, which ought to have been 24s. 6d., were only 11s.; but, in 1826, wheat being nnly 57s. 11d., wages were 9s. Again, in 1784, wheat being 48s. 10d., the sum of 1,900,000l. was expended in actual relief; which, taken in quarters of wheat, amounted to 780,000 quarters. In 1812, with wheat at 122s. 8d., 6,650,000l. being expended in relief, the comparative value amounted to 1,060,000 quarters of wheat. In 1823, wheat being 49s., and 5,770,000l. actually expended for relief alone, was equal to 2,670,000 quarters; and the whole sum levied under poor's rate in the course of that year being 6,970,000l., equalled 2,900,000 quarters of wheat, being one-fourth part of the quantity required for the consumption of England and Wales."

There appear to be in the workhouses of England and Wales about 120,000 families; and, to be maintained by the parish-rates, about 400,000 others, while as many mnre receive occasional relief, making 900,000 pauper families out of 2,493,423. In 1803, it was 750,000; in 1813, 971,000; in 1815, 896,000. In many workhouses, in 1829, four, five, or six were obliged to sleep in a bed.

The poor's rates, in 1826, were 7 millions, of which 4¾ was drawn from land, nearly 2 from dwelling-houses, and the rest from manufactories.

The poor-rates, in 1830, in England and Wales, relieved nearly 2 millions of paupers.

It was estimated, in 1810, that there are, on an average, 15,000 beggars, in and round London, who obtain from 1s. 6d. to 5s. daily. The severity of workhouse discipline, and the system of transporting them to distant parishes, with the inconceivable miseries of the journey, occasion this precarious mode of subsistence to be preferred.

1000 pauper children are born in London, in workhouses, per annum; and from 13 to 18,000 are constantly kept in all workhnuses.

In 1748, 9, and 50, the annual expenditure on the poor was but 602,000l. wheat being then but 4s. 5d. per bushel. But, in 1813, 14, and 15, in was 6½ millions, wheat being then 12s. 8d.

The known emigrations to North America, chiefly to the United States, direct, or by way of Canada, were, in 1830, 55,461; and to July, in 1831, they were 65,107. Those to the Cape, &c. were, in 1830, 1446; and, in 1831, 481.

Sixty workmen, in the Mint, at Paris, are supplied with soup under 2 francs, and with ragout for 3½ francs.

In Holland, in 1823, one tenth were poor, costing about 31 florins each.

The relief of the poor in the silk parishes of London has been as under:

	1775.	1829.
Shoreditch . . .	£3738	28,934
Bethnal Green . .	2826	17,103
Mile End	885	11,229
Hackney	1726	12,388
Spital Fields . . .	2595	5,541

In Middlesex, generally, the increase has been from 174,274 to 609,980l. In Liverpool, nine times; in Manchester, nine times; in Leeds, eight times; in Birmingham, seven times; in Sheffield, six times: in Leicester and Nottingham, six times more in 1829 than in 1775.

In Massachusets, 1 in 68 is a pauper, supported by assessment; in New Hampshire, 1 in 100; in Connecticut, 1 in 150; in New York, 1 in 220; and in lower proportions in other states. This poverty is produced by ardent spirits.

A scheme at which humanity revolts has been formally proposed—to transport parish children to Canada, as apprentices to farmers, who have few or no labourers. The *reformed* legislature will, of course, put an end to such prnjects.

The charitable bequests, held by parishes, fnr the use of the poor, amount to nearly 250,000l. per annum.

The annual rentals and dividends of endowed public charities was, in 1829, 5,506,263l.

The poor, under the Mosaic law, were entitled to the tithe of every third year; to one-sixtieth of the crops every year; and a full half every seventh year.

The Greeks and Romans duly provided for the poor. Austria, Prussia, and Russia do the same.

The Brahmins take a tenth for the poor; and the Mahomedans are enjoined by the Koran to provide for the poor.

In the United States, there is a legal provision for the poor.

England pays liberally; but the poor are left to the ignorant and insolent caprice of overseers and committees. In Scotland, the poor are protected by religion. Ireland is, perhaps, the only country called civilized, where there is no legal provision for the poor, and we behold the consequence in endless tumults and assassinations.

The *right* of the poor to be provided for arises from their concessions to the monopolies of wealth. While there is land enough for the subsistence of all, or 17 productive acres to every family, none ought to be allowed to perish for want; and if machinery does the labour of the people, that ought to be for the ease and advantage of the whole. If such is not the result, machinery is worse than useless.

In 1817-18, wheat averaging 94s. 9d. the assessments for the poor were 9,320,440l. 1,432,332l. of which was applied to other purposes. In 1829-30 the amounts were 8,111,422l. and 1,322,239l., wheat averaging 64s. 3d. In 1750, the amount was but 730,135l., wheat 27s. 11d., and in 1776, but 1,720,316l., wheat 45s.

In the State of New York 5,790 stationary poor, and 12,348 foreign, and vagrants cost 246,752 dollars in 1831, among 2 millions of population.

ANCIENT HISTORY.

History is a record of the external circumstances, or general results, of a course of public events. Its records were vague, traditionary, and erroneous, before the invention of letters, about 1500 or 1800 B. C.; and the earliest records were the Egyptian hieroglyphics, the first step towards letters, and some monuments, whose objects were described by exaggerated tradition, or, when forgotten, imagined. After the invention of writing, most people kept public scribes, or chroniclers; but, as these records, like the London Gazette, were subservient to the state, so the constant object of servile scribes was to gratify prevailing interests.

Next to the Egyptian hieroglyphics, the celestial globe, made about 1200, in depicting the heroes or incidents of the previous and passing age, is one of the least suspicious monuments: coins are others. The Chronicles of the Jews, beginning about 1200, the Parian Chronicle, the Histories of Herodotus and Ctesias, and the poems of Homer, are therefore the foundations of early ancient history.

That mankind had attained great perfection in other arts and sciences, before the art of writing and recording was invented, is evident from monuments, especially those in Egypt, and all those connected with astronomy, a science of long observation and profound research.

Early ancient geography lay in a narrow compass; Greece and Italy were the extent north and west, and the Indies in the east. The Persian Gulf, the Caspian, the Euxine, and the Mediterranean bounded the countries designated in ancient history, and which extended over 20 degrees of longitude, or about 900 miles, by 12 degrees of latitude, or 1800 miles. Arabia and Egypt lay to the southwest; Chaldea bordered on Arabia, south of the Euphrates; Babylonia lay on that river; Mesopotamia lay between it, on the Tigris; Assyria was in both; Media to the west, and Parthia to the north; Syria lay to the west, and its extent was but 400 miles long, and about 100 wide. They were large only in the eyes of the Greeks; but Bengal, some of the American States, and even France to the Rhine, are, either of them, equal to the ancient empires.

The ancients knew as little of the surface of the earth, as the moderns of the interior. Homer called all barbaroos, remote from Greece; and beyond Thrace was the hyperborean region of darkness; and beyond Ethiopia, the region of light, inhabited by Pigmies. The whole was surrounded, at the distance of 500 miles, by the River Ocean, by which the Argonauts returned from Colchis in the Black Sea. Eratosthenes and Strabo extended the land farther, and gave limited form to the old continent, but omitted China, and made Africa, Lybia. Orpheus, Herodotus, Pliny, &c. were equally incongroous, and referred every thing to the Mediterranean, as a centre. The priests taught that the Temple of Apollo, at Delphos, was the centre of the world. Beyond the Archipelago and the Levant, all was fable; and they believed that the whole plain of the earth might be viewed from any very high mountain. Some philosophers, as Thales, Aristotle, &c. taught that the earth was a sphere; but the vulgar believed the priesthood, who placed their hell under gronnd, or beyond the adjacent sea.

History necessarily begins with the art of recording, or writing, and this art appears to have been first exercised in Greece and the west, about 1300 or 1800 B. C. Like all arts, it doubtless was slow and progressive; and the first aothors were, probably, not the inventors. Sensible hieroglyphics would precede more refined ones; these would be long in taking the form of letters, and these long in being adopted and acquired. Till then, all previoos history would be tradition; and the value of tradition, in 1500 or 1800 B. C. may be estimated by its valne at this day among the negroes, the American Indians, or the New Hollanders. In England, what is the value, even in this age, of any tradition, beyond two or three generations? and, when preserved, it always degenerates into legend and absurdity.

All well-informed nations appear, after the invention of writing, to have kept chroniclers, who were the priests or astrologers, and these generally prefixed some cosmogony, mingled with claims of antiquity, popular legends, &c.

The Greeks refer the introduction of letters to Cadmus, about 1500, merely

because he introduced them, as an emigrant, from Phœnicia; the Egyptians to Memnon, about 1800, who probably borrowed them from the Hindoos; and these again improved on those of the Chinese, whose 214 keys, sustained by inflexible customs, were apparently the first transition from hieroglyphics to generic characters. Each key depends upon the number of strokes in it, and expresses a genus of ideas, while the hieroglyphic origin of the radix of most of them is palpable. It is a vulgar error that they have 80,000 characters; and they might infer that we also have as many as words, our characters for each word being different, on the same principle as theirs.

Temporary notoriety is always in the inverse ratio of permanent celebrity. That which strikes the vulgar and ignorant, is not calculated to endure the cool examination of intelligence; and, that which satisfies the intelligent few, is not understood by the vulgar multitude. Every seven or ten years has its vulgar prodigy; but the pantheon of Universal History rejects all these popular idols, and consecrates none but truly original minds, applied to subjects of substantive and universal interest.

The earliest known chronicles are those of the Chinese, Hindoos, Jews, and perhaps those of the Irish nation. Their imperfect knowledge of physics, their general recognition of astrology, and their being in the hands of the priests, have filled them with fables. Some natural facts enable us, however, to infer that sciences, the fruit of leisure, wealth, and power, existed; and thus we find, that the Chinese record an eclipse in the year 2800 B. C., and a general conjunction of the planets in 900 B. C. We find, also, that the Hindoos record eclipses 3180 years before the Christian era; also, that the Persians describe positions of stars in the equinoxes 3000 B. C.; that Alexander found at Babylon celestial observations for 1902 years, in 330 B. C.; and the Egyptians claimed observations for 480,000 years, which, taken as the astronomical period of days, would be 1500 years.

These recorded observations have been examined by modern tables, corrected by refined theories, and they exactly agree. There is, therefore, no doubt or question that these nations were astronomers 3000 years B. C.; of course, also, they *wrote* their observations; and hence the Grecian story of Cadmus, &c. must be false.

The Hindus begin the creation as a mere astronomical epoch, when all the planets were in Aries, or nearly 2000 million of years since; and then, taking in the motion of the nodes and apsides, they extend it to 4320 millions, which they call a *Calpa*, or day of Brahma. The *Yug* is a period which brings the sun and moon only into the same situation in the first of Aries, or in every 4,320,000 years, an entire Calpa being 1000 Yugs. Then 100 Calpas is considered by the priest as the life of Bramah, 50 of which have expired. A Manwantera, or 306,720,000 years, is 71 Yugs, of 4,320,000 years each, and the world is now in the 21th of the Satya Yug, and 7th Manwantera of 14. A vicala of time is 6 respirations, or 18 seconds, and 60 vicalas are a *danda*, or 18 minutes. A sidereal year is a day of the Gods.

Lucian traces the progress of the sciences from India, through Ethiopia, to Egypt and Chaldea, and the modern Brahmins refer the sciences to Bactria.

Oojein is considered by Malcolm as the oldest city in India. It is quoted in works written 1000 years B. C., and was the capital of *Puar*, a Rajpoot prince, believed to be the *Porus* of the Greeks. The ruins of Mundoo, in the same district, are 37 miles round.

The rock temples of Elephanta and Salcette, near Bombay, and of Ellora, near Aurungabad, are gigantic works, dedicated to Siva, and presumed to be more ancient than the Egyptian ruins, which, in colossal character, they resemble.

The Chinese claim an extreme antiquity; but by the reports of their literature, coming to us through Popish missionaries and prejudiced travellers, who pervert or mistake, it is difficult to arrive at the truth. Their physiognomy indicates that they are of the Tartar variety. It seems agreed that Fo-hee, their first emperor, reigned about the year 2950 B. C.; and, from that time, their histories give a regular succession of emperors and events. Yao, who flourished about the year 2357, is celebrated for his virtues and wisdom, and is said to be the author of his own history, as given in their chronicles, his reign having lasted 102 years.

From Fo-hee to Shun, was 500 years; from Yu to Kie, was 387 years; from Tching-tang to Sheeo-sin, was 612 years; from Voo-Vang to Nang-Vang, was 808 years; from Nang-Vang to Cong-tee, was 105 years.

Grozier's History of China, in 15 4to. volumes, translated from the history published under imperial authority, begins with *Fo-shee*, 2953 B. C., and proceeds to Chin-nong, Hoang-tee, and, through a regular succession, to our days.

Some scholars object to Chinese his-

tory, that *Shehoang tee* ordered all ancient books to be burnt, about 230 B. C.; and that the recovery, 60 years after, is not satisfactory to them.

The Greeks knew nothing of the Chinese, and the Romans little, till Marcus Aurelius sent an embassy, A. D. 166. In 530, the first silk-worms were brought from China to Italy.

Fohee formed the Chinese code between 2900 and 2500 B. C. Confucius, their moral teacher, flourished about 600 B. C.

Herodotus claims for the Egyptians, in his Euterpe, 17,000 years before the reign of Amasis, and, in another place, 341 generations, or 11,340 years. From Bacchus to Amasis, he counts 15,000 years. But Plato, in his Critias, reckons it but 9000 years.

Waddington considers Ethiopia as the cradle of the religion and arts of Egypt. The temples are older, and the pyramids are more numerous, though smaller. Ammon was their chief deity, as Osiris was in the Thebais and Lower Egypt. Sesostris had but temporary possession of Ethiopia; and among the 330 kings of Egypt, Herodotus says, 18 were Ethiopians. Diodorus says Ethiopia was never conquered, and that Bacchus failed against them. They call the Egyptians a colony led from Ethiopia by Osiris, and say that Egypt is but the mud of Ethiopia. They state, too, that the sacerdotal hieroglyphics of the Egyptians were used by all the Ethiopians.

Essouan, or Syane, is recorded by the Egyptians to have been, in their time, exactly under the tropic; but it is found to be in latitude 24° 8′ 6″, and the tropic now is in 23° 27′ 41″, making a difference of 40′ 25″, which, at 52.1″ in a century, gives 4654 years since the first observation. If, then, we take 1833 from this, we get B. C. 2821, or 500 years before the flood, according to the Septuagint and Usher, for this astronomical observation of the Egyptians.

In the pyramids of Gheza, the heights are to the base as 10 to 17; but the brick altar and tumulus of Cholula, in Mexico, is as 10 to 88. At Silbury Hill, equal to Cholula, the diameter is about double the height.

Herodotus relates, that Cheops employed, on his mausoleum, 360,000 men for twenty years.

The great pyramid of Cheops contains 75 millions of cubic feet. The chamber discovered in it is but the 7400th of these vast dimensions, or 36 by 17 by 19. The pyramids are believed to have been originally encased with polished stones, and these covered with hieroglyphics. An early Arabian writer says they would have filled 10,000 volumes.

Ammon was the Egyptian name of the sun, from the first sign, Aries; and the temple in the Lybian Desert was called Jupiter Ammon by the Greeks, after their Cretan Jupiter.

Herodotus refers the three great pyramids to Cheops and his two successors, Cephranes and Mycenius; but Manetho refers the first to Sophis, who lived about 400 years before Abraham.

The zodiac of Dendera, or Tentyra, is projected on the plane of the ecliptic, and is merely the horoscope of the time of completion, or of the reigning sovereign. The pole is midway between the signs, and in or near the Great Bear, which as to Capricorn is on the Cancer side, and lying even between the middle of Gemini and Sagittarius. It is now even between ten of Virgo and ten of Pisces, consequently the constellations have advanced about fifteen in Gemini, sixty in Cancer and Leo, and ten in Virgo, since it was constructed, *i. e.* $85^\circ \times 72$ years $= 6120$ years. The planets, &c. &c. are marked on it, and the outer circle is the *usual* astrological speculum.

Night begins where the two semidiscs are marked and the serpent; the semidisc standing for N. or S. latitude, and this equal point was then in Gemini. Hence it has fallen back nearly three signs, and the two circumstances agree. In the horoscope Scorpio is ascending, Taurus descending, and the Part of Fortune is in Cancer. The hour is nine in the evening, about April 20. The ☉ was in the beginning of ♉, the ☽ in ♐, ☿ in ♈, ♀ in ♓, ♂ has N. lat. in ♉; ♃ in ♒, ♄ in ♏; the dragon's head is in ♐, his tail in ♊, and all the fixed stars are located in their exact numbers in each constellation.—*Editor.*

Champollion's theory of hieroglyphics tend to prove that they are representations of ideas, and not of sounds. They are of two kinds, *hieratic*, or sacerdotal, and demotic, vulgar, or enchorial. On this view Akerblad, Young, and Champollion have imagined a sort of alphabet, by which they decypher names and some ideographic sense. The names Ptolemy, Cleopatra, and Alexander, afford the keys of comparison.

In 1821 Belzoni exhibited in London the tomb of Nechao, king of Egypt, of its natural size, with all its figures and hieroglyphics. The figures represented a procession, including captive Ethiopians, Jews, and Persians. This is explained in Chronicles xxxv. 2. and in Herodotus, who names Jerusalem Cadytis, a large city of Syria.

In 1819, Belzoni visited El Wah, the Oasis, containing the temple of Jupiter Ammnn. It is in ruins, and he was not allowed to apprnach it, but he visited the fountain of the Sun, and noted its varying temperature.

In 1817, Captain Caviglia, with great enthusiasm, and by the labour of from sixty to one hundred men for three months, removed the sand from around the great Sphinx, and found in front, beneath an enclosed temple, and altar, with inscriptions in hieroglyphics and Greek. One of the inscriptions is signed Arrian. Another put up by Claudius, and another by Antoninus. The paws are stretched fifty feet in advance of the body. Arrian's inscription speaks of "that fierce Sphinx that Thebes ere while laid waste."

The most wonderful assemblage of Egyptian antiquities is nnw at Thebes. They cover a vast extent in four distinct villages, two on each side of the Nile. Luxor and Carnac nn the eastern, and Gournou and Medinet Abbou on the western. All is colossal, in red granite, shaped and carved, overwhelming all beholders with astonishment; but, is time mncking men, for the mere names of the despots who thus employed the people, are now forgotten.

Osiris, according to Plutarch, was the genius of production and preservation, and Typhon of destruction and disorder. There were kings of Egypt of the same name and qualities, and hence the names of the abstract qualities.

On one of the statues of the excavated temple of Ebsambul, the name PSAMMETICUS was discovered by Salt, in an ancient Greek inscription, as a visitor of the place. He lived 600 B. C., 200 before Herodotus, in the Jewish epoch of Nebuchadnezzar, and is recorded by Herndotus as a patron of the Greeks, who thenceforward had footing in Egypt.

Bread, barley, and wheat, are often found in Egyptian tombs.

Pharaoh is Coptic for king.

† The Arabians call Egypt emphatically *Misr*, the place—the Jews *Misraim*.

Egypt was independent till 560 B. C. frnm the earliest ages, and then was merged in the great empires.

The Zodiac of Tentyra, now at Paris, is a spiral, beginning with Len, and ending with Cancer, in a square of 7 feet 9 inches.

In 1818 Belzoni opened and found two chambers in the pyramid of Cephre nes, the secnnd 456 feet high, and 684 feet in the base. The greater was 46½ feet by 23½ by 16½. It contained a sarchophagus 8 feet long by 3½, and 2½ deep inside, and an Arabic inscription on the wall, signifying that it had been opened by Sultan Ali Mahomet. He also discovered a temple buried in the sand, near the pyramid, and a platform round the pyramid.

The ruins of Meroe have been discovered on the Upper Nile. It has temples and fifty-four pyramids.

Sesostris, the greatest conqueror of antiquity, was, according to Herodotus, and other ancient anthnrs, king of Egypt about 1700 years B. C. and he appears in nine years to have overrun the then known world, and to have recorded his conquests by obelisks and monuments. We hear of him in central Asia, in Phœnicia, in Ionia, Syria, and Spain. His Egyptian name was Sethosis, and he is sometimes confounded with the Shishak of Jewish History, who lived 700 years later. He reigned fifty years, and was a man of great stature, or above seven feet.

Of Bactria we know little. Bailly traced a distinguished lost people in that region. It was nautical when the Caspian, Aral, Euxine, and Baltic were united. It was the due-east of Judea, Greece, and Egypt, and was the country of Zoroaster. Learned Hindoos still refer to it, as the common parent of astrology, astronomy, geometry, arithmetic, magic, &c., spread thence into China, India, Persia, &c. &c. Caucasus and the Altaic chain raise it above the general level of Asia.

The Bactrian region was the country of Prometheus, of Gog of Magogia, of Noah's ark, of men nn horseback, (the fabled centaurs nf the Greek poets), one of whom was Chiron, the inventor of the constellations, and of Cyclnps, the first builders in stone; while the western nations, the Britons, the Irish, &c. circumstantially trace their origin to tribes emigrating from that region. (See Owen Pugh, and O'Conner.)

Geology may explain what fables mystify; and writing and printing does not record. The Euxine burst into the Bosphorus and the countries of the Egean sea; thereby draining the Aral, Caspian, and channels of communication through Sarmatia to the Baltic. The Mediterranean overflowing burst the pillars of Hercules, and thereby drained the central sea of Africa, as it exists at Syrtis. These changes forced the inhabitants to seek new countries, and robust emigrants not being men nf science, carried with them only the vulgar traditions, and hence the fables of early history. In the ambition of antiquarian research, it seems strange that no European scholar and philosopher visits the regions of Bactria. It was beyond doubt

the cradle of the arts, sciences, and superstitions of all the plains, from Ireland to Formosa.

Iran or Eeran, was the country of Zoroaster, and means the land of believers; Jemsheed, according to Bailly, invented the cycle of 1440 years, in 3209 B. C.

Buffon thinks that the Grecian and Hebrew deluges were the same, and arose from the Atlantic and Bosphorus bursting into the valley of the Mediterranean. In truth, the Black Sea appears to have drained the channel, which anciently ran from the Caspian to the Baltic; and Dr. Clarke, as a geologist, insists, at length, on the certainty of this rupture between the Black Sea and the sea of Marmora.

The Phœnicians, or the Philistines, so vilified by the Jews, invented or imported writing, arithmetic, weights and measures, navigation, glass-making, and many other important arts.

They extended their trade and language on all the coasts of the Mediterranean, and established colonies at Carthage, Gades, the coasts of Spain, and even in Cornwall.

Sanchoniathon, the Phœnician historian, who wrote about 1150, calls the first pair Protogenus and Æon, and traces them down to Thoth, the Egyptian Mercury, but does not notice any intervening general flood. He relates that the seventh generation discovered the use of iron, which the Hebrew history ascribes to Tubal Cain, the son of Lamech, the seventh or ninth generation, and brother of Noah; but Sanchoniathan does not speak of the flood, in which, according to Moses, Tubal Cain, and Noah's other brothers, Jubal and Jabal, all sons of Lamech, were drowned.

Sanchoniathon assigns ten generations, like the Jews, to the early ages. He calls them Æon, Genos, Phox, Liban, Usou, Halieus, Chrisor, Technites, Agrove, and Amine. As he wrote at Beritus, in Phœnicia, and does not refer to the Jews in the adjacent country, he is supposed to have lived before Moses, but the received chronology makes him 200 years later. He quotes the Egyptian Thoth, as having lived 800 years before him.

The Book of Genesis appears to be prefixed to the Jewish laws, in the manner of Prologomena, and is an historical monument never to be sufficiently admired. The two accounts of the Creation, in the two first chapters, are in different styles. The various genealogies in another style, chap. v. x. xiv. ver. x. and xxxvi., and the narratives between the genealogies are believed to be by different pens. It was written in an age when certain monuments, described as visible "*unto this day*," were antiquities; after the distinction of clean and unclean animals had been introduced by the Mosaic law (chap. vii.); after the invention of iron in swords and gardening implements; after the nations of Canaan were formed, (chap. x.); after the Jews distinguished themselves from the Gentiles. (ibid); and after the Kings of Israel, (chap. xxxvi. ver. 31.) *i. e*, between 1000 and 596. The age of the narrative parts of the other books is equally unknown, but, as they often refer to posterior events, and to monuments, visible "*even to this day*," the Jews believe that they were edited by Hilkiah, about 624, or by Ezra, about 536.

These earliest recorded Names are as under, and merit consideration :—

Sanchoniathon.	*Genesis, chap. iv.*	*Genesis, chap. & Chronicles.*
Æon	Adam	Adam
Genos	Cain	Seth
Phox	Enoch	Enos
Lihan	Irad	Cainan
Usou	Mehujael	Malialaleel
Halieus	Methusael	Jared
Chrisor	Lamech	Enoch
Technites	Jabal	Methuselah
Agrove	Jubal	Lamech
Amine	Tubal Cain	Noah.

There is evidently a slight difference in the order, but an Irish-and-Hebrew scholar might explain the discrepancies.

The Jews themselves refer the whole to Ezra, on whom they always bestow parallel importance to Moses. To him they ascribe the collection and arrangement of their records, as we now have them; and hence it is, that Jewish tribes in the East, and in central Africa, dispersed before Ezra, have no books but the law, and that the Samaritans did not recognize the historical books.

Many peculiarities in Hebrew narratives arise from the language having no impersonal or neuter pronoun; hence every thing is personal, by the necessary idiom of their language. We say *it* freezes—they say *God* freezes.

The original language of the Jewish Scriptures being obsolete, we rely on early translations into Greek and Latin. The modern versions are from Jerome's translations, called the Vulgate. Then there is the Septuagint, a Greek translation, made for Ptolomy Philadelphus, when he was forming the Alexandrian Library, about 300 B. C.; and the Samaritan copies. The whole being verified by the compiled history of Flavius Josephus, made for the purpose of correcting Roman errors, about the

persecuted Jews, about 70 A. C. Geddes and Bellamy have made modern translations, but critics do not agree about their merit.

The birth of Abraham was, by the Vulgate, about 1996 B. C.; but if 430, instead of 215, be taken for the sojourn in Egypt, then his birth was in 2211. The epoch of the Deluge depends on the length of time assigned to the tenth and eleventh chapters. The Septuagint gives about 1100 years, and Josephus 850. The former, then, would fix the Deluge about 3300, or 1000 years before Jerome's Vulgate. An astronomical cause would carry it back another 600 or 700 years, or to 3900, or 4000 B. C. the period assigned by the Vulgate for the epoch of Adam. The Vulgate Chronology embarrasses every thing, but the Septuagint, Josephus, and the Samaritan, accord far better with all other ancient history.

As the Jews had no epochs and no chronology as a science, the guesses of commentators lead to many discrepancies. The Septuagint, no mean authority, supported in a great degree by Josephus and the Samaritan version, assigns to the period of the 10th and 11th of Genesis—

	Years.
From the Deluge to Abraham	1257
From Abraham to Jacob	290
Sojourn in Egypt, per Exodus	430
Departure to Solomon	873
Solomon to Christ	1156
	3906

Instead of 2348, by Jerome's Vulgate.

Taken thus, the Jewish history embraces all the demands of the astronomical records, and the combined pretensions of general ancient history, while 1833 added to 3906, gives 5739 years since the Deluge.

The Vulgate makes the Deluge 2348 B. C., to which adding 1833, we get but 4187, or 1558 less than 5739; while it is curious that the modern Jews date the current year 5593.

The Editor, on a physical theory (the progression of the perihelion) makes the mean time 5766 years, a very close approximation to the Septuagint, Samaritan, and Josephus of 5739 years, and the present Jewish year 5593. The perihelion has moved 99° since it passed the equator, and it moves 360° in 20,931 years, that is, 1° in 58.14 years, or 99° in 5766 years, and the physical effects would operate for a time, variously estimated in different countries. No parallel proof, drawn from science, has ever so completely verified the truth and authenticity of the Jewish Scriptures, while they verify the theory.

The next northern deluge will be in 81 times 58.14 years, or 4709 years; that is, anno domini 6542, or 50 or 100 years earlier.

The year of the world, by the Alexandrian and Abyssinian accounts in 1833, is 7325. But the modern Jewish year is 5593, doubtless from the Flood. It is also 4934 of the Hindoo Calilug.

Chronologers and critics, in various estimates of authority, differ in their conclusions about the age of Adam, between 6984 and 3670 years B. C.

The Deluge of Genesis took place in 2348 B. C. according to the Vulgate; and to the Samaritan in 3906 B. C. That of Ogyges, in Bœotia, 1796 B. C. and that of Deucalion, near Parnassus, in Thessaly, in 1580.

The records and traditions of all nations refer to a general flood, and *Geology* affords conclusive evidence of many in all the strata and debris; while *Astronomy* demonstrates their cause to be the elliptical orbit of the earth, and the progression of the near point of the ellipse round the ecliptic in 20,931 years.

Berosus, an ancient Chaldean, relates that Xixutor, *tenth* King of Chaldea, was warned by the god of the country to build himself an ark, to escape a deluge. Its length was five stadia, and width two, *i. e.* 3000 feet and 1200 feet. He launched it on the Euxine, and took in his relations, and birds and beasts. The flood abated, and his vessel settled on Ararat; before which, Berosus relates the particulars of his sending forth birds. Did Berosus, who lived about 320, copy this from the Jews, or did these copy it while in Chaldea? The Jewish ark was 300 cubits by 50, and, if great cubits, of 11 feet, 3300 feet by 550, and 330 feet high. Not very different from Berosus.

The Mexicans had a tradition of a deluge, in which *Coxcox* was saved, and a serpent woman. They had pyramids and traditions of four regenerations like the Hindoos, hieroglyphic writings, &c.; all indicative of connection with the Old World.

The Arabs record a flood which destroyed Saba, their capital, and other towns, in early ages. It was caused, they say, by the breaking of a vast reservoir, equal to a mountain, built by Saba, and is called the inundation of Al Arem.

The Jabal, Jubal, and Tubal-cain, of Genesis appear to be very similar characters to the Pan, Apollo, and Vulcan, of the Greek Mythology. Lamech, their father, and the son of Methusael, or Methuselah, was descended from Cain, by chap. iv., and from Seth, by chap. v., which latter makes Lamech the father of Noah; consequently the fathers of the arts, as Noah was their

brother, must have been drowned in their brother's flood.

The Jews were of three parties, the Hierosolymites, or people of Jerusalem, who claimed to have the only temple; the Samaritans, who occupied the district of the ten dispersed tribes, and had a temple of their own, and their own version of the scriptures; the Hellenist, or Greek and Egyptian Jews, who had a temple at Bubastis, called the Onion.

It happens that no Greek writer quotes the Jews or their histories; and Josephus assigns, as a reason, that Theopompus, a Greek historian, who proposed to notice them, went mad, and discovered his crime in a dream; and that Theodectus, a great dramatist, who noticed them, was struck blind, and recovered his sight only by penance.

Our translation states, that Abraham was called out of *Ur* of the Chaldees; but the original is, that "he went out of the *fire* of the Casdims to go towards Canaan." This is explained by the Jews as referring to his being condemned, by Nimrod, to fire, for breaking his father's idols, and to his brother Haran being burnt. It is stated, in 28 v. chap. xi. in literal translation, that Haran died in the fire of the Casdems.—*Blackwell.*

The Jews, according to their own history, were descended from Abraham, a Chaldean; but their enemies, Diodorus Siculus, Tacitus, Celsus, the Emperor Julian, &c. describe them as Cretans, who settled in Idumea, so called from Mount Ida, in Crete, and hence the name Judea. They also record, that a contagious leprosy breaking out in Egypt, Amenophis and Ramesis drove all the diseased into the deserts of Idumea, where their chief was Moïes, a former priest of Osiris, and under his institutions they finally settled themselves in Judea. Their exclusive ordinations and tenacity in maintaining them, drew on them the special hatred of the various ambitious conquerors of the East; and the Romans, in particular, exterminated them with remorseless cruelty, till they expelled them from the district. Their present numbers in all countries must be immense, and they are estimated at four millions in Europe, two in America, six in Africa, and twelve in Asia.

The history of Adam and the first men is given in chap. v. of Genesis. It states, "that male and female created he *them*, and blessed *them;* that Adam (one of *them*) begat Seth, 130; and afterwards, in 800 years, begat sons and daughters. The Hebrew writer does not affect the singular in creation, but appears to restrict his history to Adam, the ancestor of Abraham. This explains how Cain found a wife, and built a city in the land of Nod.

The 27th chapter of Ezekiel makes a similar enumeration of the same nations as that in the 10th chapter of Genesis, speaking of them as his own contemporaries, and as connected with the Tyrians of that day. Ezekiel lived about 600 B. C., during the Babylonish captivity; and Ezra, the reputed editor of the Old Testament, seems, therefore, in the 10th chapter, to have classed the nations as known to the Jews in the age of Cyrus, and the words refer to this after-period. The Hebrew nomenclature, so different from the Greeks and Romans, leads to perplexity; but there can be no doubt that, instead of a century, the Hebrew writer intended to describe the rise and progress of many nations in indefinite centuries in the 10th chapter of Genesis. The formal genealogies are in a different style, and apparent interpolations, affording no chronological data. The first chapter of Chronicles throws further light on the same subject, as a summary of Genesis.

Bel, the Babylonish name of the Sun, was pronounced *Baal* by the Hebrews. Baal, Bel, or Pel, is the ancient name of all great buildings and pyramidal temples through the East.

The name Babel, or Babylon, meant the City of God. The Persians refer its foundation to Tamarath. Alexander found in it celestial observation for 1903 years. Herodotus makes no mention of the Nimrod of the Jews.

Moses, the Jewish legislator, headed them in their departure from Egypt about 1491, the epoch of the building of Thebes, and the introduction of letters into Greece by Cadmus.

The Samaritan Jews, or kingdom of Israel, recognized, as the basis of their religion, only the Pentateuch, and rejected the rest, reading even the Book of Joshua as Apocryphal. The Christians, from the time of the fathers of the Romish church, have recognized the whole of the Jewish histories as of divine inspiration.

The Canaan of the Twelve Tribes extended from lat. 31° 15′ to 33° 5′, or 130 miles *long;* and, from long. 35° to 36° east, or 45 miles *wide.* The two remaining tribes of Judah and Benjamin were about 40 miles long and 30 wide. Samaria lay 40 miles north of Jerusalem.

The Jews were in possession of Canaan from about 1100, the age of Samuel and Saul, to 721, when ten of their tribes were dispersed; but the other

two tribes maintained themselves till 597 B. C.

The whole kingdom of the Jews lasted 120 years; of Israel, separately, 246 years longer; and of Judah 370 years; and both were then merged in the Babylonian empire, then in the Persian, the Macedonian, Roman, Saracen, and Turkish empires.

Hellah is the nearest town to the present ruins of Babylon, and Mosul is on the site of Ninevah.

The chronology of Newton is not insisted on. He fixes the foundations of Argos and Athens in 1080; but the received chronology assigns 1856 to the first, and 1556 to the second.

Minos reigned, in Crete, in 1400; and Theseus, in Attica, in 1234. Orpheus flourished about 1280; and the Trojan war lasted from 1193 to 1184. Homer and Hesiod lived about 900, and the Olympiads began in 776.

The Romans destroyed the independence of Greece by the taking of Corinth in 147 B. C., and in the second year of the 158th Olympiad.

All systems of chronology agree that Cyrus took Babylon in 538 B. C.

The Arundelian Marbles, or *Marmora Oxoniensis*, were, with other Grecian antiquities, collected by Dr. W. Petty, in the reign of James I., at the expense of the Earl of Arundel. The whole consisted of 37 statues, 128 busts, and 250 inscriptions, besides gems, altars, &c. The earl's grandson presented the inscriptions to the University of Oxford; Dean Prideaux published them in a folio called *Marmora Oxoniensis;* and other accounts, by Mattaire and Chandler, have since appeared. The Parian Chronicle is in capitals, without spaces or stops. In one of them the parties swear to a treaty "by Earth, Sun, Mars, Martial Minerva, Diana, Heather Sipylene, Apollo in Pandi, Venus Stratonicus, and all the other gods and goddesses." On the tomb of a Phœnician it is stated, that "he and his wife are with the blessed in Elysium; hence, the doctrine of a future state seems to have been familiar with the early Greeks. It seems to have been engraved about 170 B. C. The second epoch states as follows: "Since Deucalion reigned at Parnassus, in Lycorea, Cecrops reigned at Athens 1310 years." Epoch 4 states, "Since a deluge happened in the days of Deucalion, and he fled from the rains out of Lycorea, taking refuge with Cranaus; and built the Temple of Phyxion and Olympian Jupiter, and offered sacrifices of preservation, 1265 years, Cranaus reigning at Athens." This flood, in Thessaly, then was in 1435 B. C., but the deluge of Moses was 2318 or 3900; and, hence, there is no reason for confounding those events. Moses died in 1452, 17 years before Deucalion's flood. The same inscription also tells us, that the first ship from Egypt arrived in Greece in 1512 B. C., *i. e.* about 14 years before the Israelites left Egypt.

Ninus and Semiramis were warlike sovereigns of Assyria, who, by large standing armies of nearly two millions of fighting men, overran central Asia to the Indus. Ninus left his wife guardian of his son, and she extended her conquests into Egypt and Ethiopia; but, in an expedition against India, she was totally routed by Strabobates, the king; and, after a reign of 40 years, she resigned to her son. In their time Ninevah was built and adorned, as a rival to Babylon. They flourished about the year 2150. Besides their vast armies, they had 10,600 armed chariots and fleets of fighting ships, while other kings brought nearly equal forces into the field, and terrible slaughters covered that garden of the world. The empire lasted 1400 years; but, in 771, it was overthrown by a conspiracy of three viceroys, who divided it into the three kingdoms of Assyria, Babylon, and Media. Such are the accounts of the Greek and Roman historians. The Assyrian kingdom, 150 years after, was conquered by the others, and Ninevah destroyed.

Cyrus, the founder of the Persian empire, lost his life in a battle with a Scythian tribe, in 529 B. C. But Xenophon says, he died in peace.

The native Persian historians begin their history with king Kaiomurs, who was the grandson of Noah, say the Mahomedans; but the first created man, according to the Guebres. He was such a personage as Osiris, Bacchus, or Rama. But one historian, esteemed by Sir W. Jones, carries back their history to Mahabad and his wife, who escaped the last great flood. The history of his successors, of Jemsheed, the grandson of Kaiomurs, Khoosrou, Afrasiæib, Isfundear, Roostum, and Danab, or Darius, are then filled with wonders like the Arabian Nights.

These native Persian writers take no notice whatever of the ancient Persian empire, described by the Greeks and Jews; on the contrary, Persia is by them limited by the Euphrates, and all the glories and power of the country, if they ever existed, are buried by its own historians in unaccountable oblivion. We learn from Malcolm, who had the best sources, that one Zohank, a foreigner, dethroned Jemsheed, but was slain by Kowah, a blacksmith, who restored Farlhoon; and, hence, a leather-apron became the Persian stan-

dard. But no Greek author names this standard; and it is very extraordinary that the Persians say not one word of *Xerxes*, or of any king named by the Greeks or Jews, differing even as these do in names, but agreeing in the power of the empire. All they say of this period is, "that Gushstasp, (Hystapes,) protected Zoroaster; and that a King of *Rome*, named Secunder, (Alexander) subdued a King of Persia, named Darab!" One of their dynasties is called *the Judges*, a curious similarity to Jewish history. Jemsheed is said to have reigned 700 years, and Zohawk 1000 years, which, of course, must mean their dynasties.

From Alexander to Artaxerxes Babigan, who, in 226 A. D. expelled the Parthians, *i. e.* an interval of 500 years, Persian history is a void. He then established the Sassanian dynasty. A subsequent sovereign, Mahmnnd, extended the empire from the Tigris to the Ganges; the Seljnckian dynasty followed, then the Sooffees, (or Sophys) the Moguls, the Affghan, amidst crimes of despotism, only to be paralleled by despotism in other countries.—*Malcolm.*

Cylindrical signets, engraved in intaglio on jasper, chalcedony, jade and onyx stone, about one or two inches long, and half an inch in diameter, were used as seals in Ethiopia, Chaldea, Arabia, and other nations of western Asia. They are found in the ruins of Babylon, Nineveh, &c. and are mystical and curious.

Landseer has displayed profound erudition in illustrating several of them, and he tells us, that the Romans used the same, and that the signet of Augustus was the sign Capricorn, under which he was born.

Persipolis is in the plain of Merdasht, across which runs the Bend-emir, or Araces, and near Shiraz. It is called the Throne of Jemsheed, the second king, or the palace of forty pillars, and is said to be that of Darius, burnt by Alexander when drunk. It resembles, in magnitude and gigantic sculpture, the Egyptian temples; but the execution is far more perfect, and the figures and objects more interesting and numerous. It is about eighty miles north of the Persian Gulf, and two hundred and twenty east of Babylon.—*Porter.*

The early history of Greece, like that of all nations before the invention of writing, is lost in vague tradition. The Greeks themselves had no agreement on the subject. Some derived their origin to a colony of Hellenists, others to Pelagians; but all agreed, that a colony of Phœnicians settled there under Cadmus, and another of Egyptians, under Cecrops; and, hence, their literature and theology.

Thucydides, in 410 B. C. states, that no authentic materials of Grecian history existed above two centuries before Solon, 600 B. C. All previous was poetry, imagination, and mythology.

The Greeks spread from Greece, through all the Islands, to the coasts of Asia Minor, to Sicily, Lower Italy, and on the coasts of the Euxine. In Africa, they founded Cyrene; in Gaul, Marseilles; and, to the west, Rhoda and Emporia. The Macedonian conquests extended their language into the interior of Asia.

Iron was said to have been discovered, owing to the forests on Mount Ida being burnt by lightning, about 1500 years B. C. But Moses refers it to Tubal Cain, or Vulcan, the son of Lamech. The discovery of iron would effect a social revolution, equal to that of gunpowder.

The Island of Atalantis is described by Plato, in his Timæus, as of vast extent and population in the Atlantic, but swallowed or absorbed by an earthquake. Many Hindoo legends point to the circumstance; and Whitehurst quotes, in proof, the geology of the coasts of Ireland.

Some suppose that the Canaries are fragments of that extensive island of Atalantis, which Plato, in his Timæus, says, was absorbed by the sea, 9000 years before his time. The sea is said to be shallow in that vicinity. Pliny mentions traditions of the irruptions of the Atlantic into the basin of the Mediterranean.

The Argo-nautic expedition of Jason to Colchis is a tissue of miserable legends, not superior to the nursery story of Valentine and Orson. Perhaps some predatory voyage was made by young men of Thessaly, with Prince Jason at their head; and then the narrative of it is a fair specimen of the value of tradition. It was such a voyage as a modern steam-packet would make in a week, and yet it appears to have occupied several years.

In the early epochs of Greece, a pirate was more honourable than a merchant.—*Odyssey*, 3.

Ancient writers did not agree whether Hesiod or Homer were prior. Hesiod mentions the Gods in Homer, but Homer might have taken them from Hesiod, or they might have been the deities of the age, and invented by neither. Aulus Gellius, Philochorus, Xenophon, L. Accius, and Marcus Varro, severally differ on the subject.

The famous lines of Hesiod, relative to the rising of Arcturus out of the main, proves that he lived in Greece,

for Arcturus rose E. N. E., and the Archipelago must have been the sea, over which he saw Arcturus rise. His 60 days, from the winter tropic, gives the commencement of Pisces, and 15° Aries sets when Arcturus rises. Hence the precession, for the whole, must have been a sign and a half, or $\frac{25866}{8}$ = 3233 years, from which, subtracting 1833, we get the year 1400 B. C., as the undoubted period when Hesiod wrote.

Hesiod discriminates between gods and men, in ascribing to the era of the latter the age of gold or money, the curse of the human race, and the foundation of all the bad passions, by the facility which it affords to their gratification.

Homer wrote the Iliad and Odyssey, to celebrate the Trojan War; possibly a real event, but exaggerated, dramatized, and personified by the poet's imagery, and machinery. The siege lasted 10 years, and took place about 1180 B. C., and Homer is generally supposed to have lived about 910. Lycurgus was nearly his contemporary, and was said to have collected his works; but this is ascribed to Thales, who lived about 300 years later. Orpheus was the earliest Greek poet, and an improver of the lyre, in the heroic fabulous ages which preceded Homer.

Plutarch's life of Theseus resembles the British accounts of Arthur, but it joins the age of romance with that of real history. Theseus lived about 1300, while Minos was King of Crete. He coined money with oxen upon it, which became the name of the coin; hence, we hear that Pythagoras sacrificed 100 oxen, on discovering the 47th of the First Book of Euclid, &c.

The fable of the Mundane Egg probably arose from the egg-form of the earth's annual orbit, the form always generated by two central forces operating on magnitude. A vase 30 feet in circumference, with a sculptured bull upon it, has been found near Limisso, in Cyprus, near the site of the Temple of Amathus, which Mr. Landseer translates *Love Incense*.

Athens was founded by Cecrops, 1556 B. C. Ægeus governed 1283. Theseus, 1235. Codrus, 1091. Medon, 1070. Draco, 623. Solon, 594. Pisistratus, 560. Pericles, 441, Demetrius, 317. Poliorcetes, 300. Taken by Sylla, 86.

Sparta was founded by Lelex, 1302 B. C. Lycurgus, 884. Theopompus, 770. Leonidas, 491.

Corinth was built in 1520. Danaus reigned in 1485. Periander in 630.

Argos was founded by Inachus, in 1856.

Thebes founded by Cadmus, in 1493. Œdipus reigned, 1266. It was taken by Alexander, 336.

Lacedæmonia and Attica were the most renowned of the Grecian states: the first for military prowess, and the other for naval power, arts, and literature. Lycurgus arranged the severe institutions which gave character to one; and Solon, in 594, established those democratic institutions in Athens which drew forth all the genius of the people; but it was too popular to last.

In 431, a dispute between Corinth and Corcyra, or Corfu, led to the interference of Athens and Lacedæmon, and brought on the first Peloponnesian war, in which all the Grecian states were mingled; but, in eight years, it ended in the triumph of Athens. A second struggle ensued; and, in 404, Athens was taken and dismantled.

The retreat of the 10,000 Greeks, under Xenophon, arose thus,—they were mercenaries of Cyrus the younger, and, in marching on Babylon, in 401, his army was defeated; but the Greeks kept in a body, and retreated through Asia to Thrace.

Sparta, so celebrated in Grecian history, was near the modern town of Misitra, in the Morea, but no vestige of it above-ground has been visible for some hundred years.

Corinth, one of the most splendid cities in Greece, owed its advantages to commerce; and, to its luxury, we are indebted for the Corinthian order, in which was constructed the Grottos of the Muses, a Theatre and Stadium, a superb Temple to Neptune, and another to Venus.

Thebes, once the celebrated capital of Bœotia, has, by the Turks, been called Stives, and the country is called Stramulippa. Thebes was said to be built by Cadmus, an Egyptian emigrant, who called it after the Egyptian Thebes, and he introduced among the Greeks his alphabet of 16 characters.

Crete, or Candia, always deserves to be mentioned with respect, as the nursery of civilization, a circumstance favoured by its insular position, the fineness of its climate, and the fertility of the soil. Among the earliest monarchs was Rhadamanthus and Minos, whose laws and policy were so much praised. The Cretans lost their independence when the lust of conquest was indulged by the Romans, about 50 B. C. In the age of the Trojan war, Crete was said to contain 100 cities, which, a modern traveller says, may all be still traced.

The stars were classed into constellations about the year 1200, for the figures include all the heroes of the

previous age, and some of the Argonauts, but none of the Trojan heroes. The same systematizer also gave names to the planets, and adopted those of receot celebrity in the Cretan court, as Kings Saturn, Jupiter, Vulcan, Mars, &c. Astrology sanctified these names, and poetry soon deified them. Their numerous progeny arose from the ascendancy of these planets at birth, and a man born when Jupiter was strongest, and Virgo ascending, would be called a son of Jupiter and Ceres, or of Jupiter and Diana. The Astrologers were at once the priests, poets, and statesmen; and, hence all the fables and superstitions about these names given to the planets and stars.

Saturn appears to have been King of Crete, in whose time *Iron* was discovered on Ida, by the conflagration of its woods. Jupiter was his son, and successor. Mars, was a son of Jupiter, and prince of Crete. Venus was a beautiful Cyprian, who married Vulcan, and he wrought the new iron mines, and made iron implements. Mercury was another son of Jupiter. The Sun was called after Apollo, another prince; but, having a previous vulgar name, that of Apollo was sunk in it. The Moon was called after Diana, Jupiter's daughter, but in general use, also, sunk in the popular name.

The virtues and powers ascribed to the planets by astrology were soon, by association, referred to the name and the persons, while superstition, obscure history, priestcraft, and poetry, in 2 or 300 years, raised on this simple basis the amusing fabric of the Heathen Mythology. In these ages, even as at this day, in eastern coorts, the astrologer was also priest and statesman, and the reigning planet, at the birth of a man, or at the founding of a City or Temple, was the father or genius; hence, the apparent numerous progeny of these gods, and their multiplication io different persons and places.

Many confusions in ancient history were thus created by astrology. Lucian says, that Æsculapius was called the son of Mars, merely because Mars was lord of his ascendant; and so another was the son of Jupiter, because Sagittarius was ascending at his nativity. Cities too had their nativities, and hence the lord of the ascendant was their tutelar deity, and his or her worship adopted in a tangible form. The first stone of a city, or great structure, laid when Cancer was ascending, would render the Moon, as Diana, Cybele, Isis, &c. their future goddess. The hour in which a victory was gained, which fouoded a natioo, was also, to an astrologer, a means of setting a figure, and fixing the lord of the ascendant, and thence the tutelar deity of that nation! and, on this an astrologer and poet, aided by the celestial globe, and the approaches, and recessions, and aspects of the planets, woold raise a thousand fancies.

According to the Cretan astrologers,

Saturn governed ♒ and ♑
Jupiter (alternate) ♓ . . ♐
Mars (ditto) ♈ . . ♏
Venus (ditto) ♉ . . ♎
Mercory (ditto) ♊ . . ♍
The Moon . . . . . ♋
The Sun . . . . . . ♌

The Egyptian Zodiac commenced with ♌, the sign of the Sun. The Moon, or ♋, preceded it. Mercury, *i. e.* ♊ and ♍, was next to these, corresponding with his elongation. Venus next, *i. e.* ♉ and ♎, each way; then Mars, ♈ and ♏; then Jupiter, ♓ and ♐; and, lastly, Saturn ♒ and ♑.

Apollo, the Sun, as brother of Diana, the Moon, had respectively ♌ and ♋ adjoining each other.

The celestial globe was divided into constellations after the age of Perseus, and also after the Cyclops, who built Mycenæ, perhaps, about 1200 B. C.

The Ancients also assigned the twelve major Gods and Goddesses to the twelve Signs of the Zodiac.

Aries	Minerva
Taurus..................	Venus
Gemini..................	Apollo
Cancer..................	Mercury
Leo	Jupiter
Virgo	Ceres
Libri	Vulcan
Scorpio	Mars
Sagittarios	Diana
Capricorn	Vesta
Aquarius	Juno
Pisces	Neptune

The twelve houses also had their planets; materials enough for superstition and fable, and for all the ancient mythology.

Those who explain ancient history, as enigmas of the constellations and signs, forget that the arranger of the constellations and signs was more likely to make it in subservience to the traditions and legends of the day.

It may seem bold to refer to so modern an epoch as the Cretan kings for these superstitions, but it is a fact that there were such Cretan personages. Astronomy and astrology were,

however, far more ancient, but the Cretan nomenclature associated the persons or personified the stars and planets, whose influences were then referred to the names and persons. The man Jupiter soon governed all good fortune, as the star Jupiter; and Jupiter became, therefore, the god of men's idolatry, and hence the mythology of the Greeks, which easily obtained ascendancy along with astrology, and the poetry of learning. The Greeks founded a mythology on this personified astrology; but the Hindoos, Egyptians, &c. practised astrology with abstract, or descriptive names of the planets and stars, and it therefore led to no stellar mythology. The twelve signs of the zodiac were probably named ages before, then the constellations, and finally the planets, by some courtly Cretan astrologer.

The chief magistrate of the Athenian republic was called the archon; and, latterly, they were nine in number, chosen annually, and serving as an executive government.

There were nine archons at Athens, and the first was called King; the second Archonte, or Judge; the third Polemarque, or Generalissimo; and the others, Thesmothetes, or Law-makers, chosen by ballot.

The Areopagus, or Senate-house, was built on a hill, in 1400 B. C.

The Turks call Athens Setines. It was, for 487 years, under 17 kings. In 504, it became a republic. In 403, it was taken by Lysander, for the Lacedemonians. In 86, it was taken by Sylla, for the Romans; and, in 1455, by Mahomet II. Its famous buildings were the Areopagus, the Lyceum, the Academy, the Portico, and the Temples.

The Amphictrionic Council was a congress of representatives from 13 cities in Greece.

The Greeks adopted their Olympiads in 776 B. C.; but previously their histories are jumbled in confusion.

Ogyges, about 1856, was the first king of Athens. Cecrops, the next noted king, was an Egyptian, and reigned about 1556. Theseus reigned about 1300.

The public games of the Greeks were the Olympic, Pythian, Nemean, and Isthmian.

Pericles expended 100 talents of gold, (547,500*l.*) on the Parthenon, the materials being local, and the labourers, slaves.

The brilliant epoch of Grecian history was from about 600 to 300, or the period of Jewish history described by Nehemiah and the Apocrypha. But the history of neither corroborates the other, though so near; and no Greek writer of the classical ages speaks of the achievements of the Jews, though Homer was cotemporary with David and Solomon. The Greeks were travellers.

The battle of Arbela, which ruined Darius was fought Oct. 1, 331 B. C.

At the death of Alexander, his generals were thus situated:—Perdiccas and Leonatus were regents; Antipator and Crateras governed in Greece; Ptolemy held Egypt; Lysymachus had Thrace; Eumenes, Cappadocia, &c. Antigonus, Lycia, and Pencestes governed Persia; Python, Media; and Seleucus, Syria and Babylon. They established kingdoms, and some of them founded dynasties; but, for the most part, they were military tyrants, and died violent deaths. The mother, wives, brother, and children of Alexander, were all murdered by them.

The Hindoos recognize the invasion of Alexander, under the name of Mahadukoit Kounha, and call him the great robber and murderer.

Three of the most atrocious acts in the history of human crimes were the siege and destruction of Tyre by Alexander; of Carthage, by one of the Scipios; and of Jerosalem, by Titus. Histories, which laud such monsters, ought to be consigned to the flames.

The Bacchus of the Greeks had some resemblance to Moses, if they were not the same. Orpheus, about 1200, calls him *Mises*, (saved from the Nile,) educates him in Arabia, makes him pass dry through the Red Sea and two rivers in India, command the Sun to stand still, cause wine to spring by striking the ground, and engrave his laws on two tables of marble. But the Egyptian histories, cited by Josephus, Clement, Origin, &c. are silent on the subject.

The Grecian and Macedonian Pike was from 21 to 18 feet, and held five or six fast from the end. The Greeks stood in three feet, and the Romans, with their sword and buckler, required six feet. Great generals have preferred the pike to the musket.

On Mount Helicon, near Leuctra, now Leftra, there is a convent of St. Nicholas, and a fine spring of water on the spot, the Grove of the Muses.

Moont Parnassus is described, by Clarke, as one of the highest in Europe. He likens the Vale of Tempe to Dove Dale, but larger, and hills higher, in which there now are superior cotton manufactories of Germans and Greeks.

The Elgin Marbles were brought from the Temple of Minerva in the Acropolis at Athens, called Hecatompedon,

and Parthenon, and erected by Phidias, under the administration of Pericles, 500 B. C. The Grand Seignior gave Lord Elgin, the British ambassador, leave to remove them.

The early history of Rome is filled with the grossest fables, to flatter public and family pride. It is believed there is no foundation whatever for the story of Romulus and Remus, and for the chief part of the romances of the early history. Down to 3 or 400 B. C., the Roman history is as little to be relied on, as the British history of Geoffry of Monmouth, whom Dionysius most nearly resembles. If they had previous histories, they were destroyed in the Gaulic invasion, in 385 B. C.

The Roman Empire, from first to last, was founded on plunder. The wars of Europe, including those of the Holy Alliance, have chiefly had the same object.

The Roman senate were 300, and in Cæsar's time 900, and in Augustus' 600.

The Agrarian law, at Rome, had reference simply to the equal divisions of conquered territories, it being the original system to divide such lands among the Roman citizens; but subsequently the generals and soldiers claimed the whole, and vast monopolies of land were the consequence. Gracchus and his brother proposed, that no man should hold above 600 *jugera*, or 350 acres English, proposing to pay the owners, for lands relinquished, out of the public treasury.

Rome was founded 753 B. C. by Romulus. Numa Pompilius began to reign 715. Tullus Hostilius, 672. Ancus Martius, 640. Tarquinius Priscus, 616. Servius Tullius, 578. Tarquinius Superbus, 534.

First Consuls, 509.

Lartius, Dictator, 498. Cincinnatus, Dictator, 456. Sylla, Dictator, 82.

Julius Cæsar, Dictator, 48. Octavius, Emperor, 31 B. C. Tiberius, 14 A. C. Caligula, 37. Claudius, 41. Nero, 54. Galba, 68. Otho and Vitellius, 69. Vespasian, 69. Titus, 79. Domitian, 81. Nerva, 96. Trajan, 98. Adrian, 117. Antoninus, 138. Commodus, 180. Severus, 193. Caracalla, 211. Alexander, 222. Gordian, 238. Philip, 241. Decius, 249. Gallus, 251. Valerian, 254. Gallienus, 260. Aurelian, 270. Probus, 276. Diocletian, 284. Constantine, 306. Constantius, 337. Julian, 361. Jovian, 363.

Division of the Empire, 364, between Valentinian and Valens.

Rome and West, under Gratian and Valentinian II., 375. Honorius, 395. Valentinian III., 424. Majorian, 457. Severus, 461. Anathemius, 467. Augustulus, 474.

The Western Empire Dissolved, in 476, by Odoacer, King of the Heruli.

Though both Greeks and Romans stigmatized other nations as barbarians, and their misrepresentations are too generally received, yet the aggressions, ambition, and policy of the Romans, in playing off nation against nation, and employing one to conquer another, cannot be sufficiently condemned. The union of nations to assert their own independence was just, and a philosopher will not condemn those associations of the northern nations which drove the Romans into Italy, and even followed them there, though it might suit the Romans to call such patriots barbarians.

The fortune of Rome was singular. It was founded by banditti 753 B. C.; from the year 100 B. C. to 300 A. C., the persevering policy of these insatiable bandits ruled the world by the sword; and, from 300 to 1,500, all Europe, by spiritual power, still governing half its states; and its language governing all learning even after 2,586 years.

The battle of Cannæ, so bloody and so fatal to the Romans, but so useless to the Carthaginians, was fought 216 B. C. Hannibal commanded, on one side, 50,000 Africans, Gauls, and Spaniards; and Paulus Æmilius 88,000 Romans, and not more than 4,000 of the Romans escaped. Hannibal sent three bushels of rings, of slain Roman knights, to Carthage.

40,000 Romans were slain on the Allia, 300 B. C., by the Gauls, under Brennus, a British prince.

Carthage, the commercial rival of Tyre, and which, unlike Tyre, foolishly aimed at dominion as well as commerce, was built in the 9th century, B.C. They ravished the dominion of the sea from their parent Phœnicians, and maintained it for 5 or 600 years. Dido, a Tyrian princess, settled herself at Carthage, owing to differences with her brother Pygmalion, and, upon an isthmus of a Peninsula, which formed a bay, she laid the foundations of Carthage. It was divided into three parts, Byrsa, or the city; Megara, or the suburbs; and Cothon, the port, the entrance to which was but 70 feet broad. The outer harbour was for merchants' shipping, and the inner for ships of war. In 2 or 300 years it was 23 miles round, and contained 700,000 inhabitants.

A passage in Plautus proves that their language was identical with the ancient Irish, as it can be read at once by any lettered Irishman. Wealth and property were the only foundations of rank and power, and from this class two chief magistrates and legislators were annually elected. They worshipped

Saturn, perhaps, because that planet ruled either at the birth of Dido, or at her landing on the coast; they also worshipped Baal, or the Sun, and Urania, the genius of astrology. They traded through Africa, round the Mediterranean, and into the Atlantic, for they were masters of the Spanish peninsula.

Rome and Carthage quarrelled about their respective ascendancy in the Mediterranean, and the first punic war, of 24 years, began in 264 A. C. and the second punic war, of 17 years, began 218; the third began in 149; and, in 146, Carthage, to his eternal disgrace, was totally destroyed by Scipio. Gracchus began to restore it in 122, and in another 200 years it again became a considerable city, but, A. D. 431, it was utterly destroyed by Genseric, the leader of the Vandals.

Besides Spain, and probably Ireland, and the Canaries, the Carthaginians held in the Mediterranean Sardinia, Corsica, Malta, and the Balearic Islands. Their attempt to conquer Sicily diminished their power, and drew on them the fears and jealousy of the Romans. All commercial people have, in like manner, been ruined by a passion for territorial aggrandisement, partly with a view to the corrupting patronage of foreign governments, and partly for the purpose of forcing the sale of their commodities. Of the discoveries and science of the Carthaginians we have no knowledge, because we receive our accounts of them through their inveterate foes, the Roman authors.

Julius Cæsar was a profligate young patrician, who, being two millions in debt, had interest enough to obtain the command of an army, with which he plundered Gaul and other nations; and being superceded for his enormities, he turned his army against his country, and destroyed her patriots, at Pharsalia, with his trained mercenaries. Then trampling on the laws, 48 B. C., he made himself dictator, till put to death by a band of senatorial patriots, after four years usurpation, in 44 B. C. The Commentaries which bear his name, and which are read in schools as his, were the production of Hirtius, a consul killed by Antony, who wrote the Wars of Gaul, and of Appius, who wrote those of Spain and Egypt.

Augustus boasted that he found Rome brick and left it marble.

Nero set fire to Rome on the 19th of July, 64. The fire continued six days, and consumed three-quarters of that fine city.

From Julius Cæsar's death, till 475, there were 64 Roman emperors, the last being Augustulus. Their reigns averaged only eight years; and, out of the 64, 45 were monsters of crime and vice.

The following was the Fate of the 64 Cæsars, in 500 years.

44 B. C. Julius, assassinated.
14 A. C. Augustus.
37 Tiberius, poisoned.
41 Caligula, assassinated.
54 Claudius.
68 Nero, killed himself.
— Galba, murdered.
69 Otho, ditto.
— Vitellius, ditto.
— Vespasian.
81 Titus.
96 Domitian, killed.
98 Nerva.
Trajan.
138 Adrian.
161 Antoninus Pius.
180 Marcus Aurelius.
193 Commodus.
— Pertinax, murdered.
— Dedius Julianus, ditto.
210 Severus.
212 Geta, murdered.
217 Caracalla, ditto.
218 Macrinus, ditto.
222 Heliogabulus, ditto.
235 Alexander, ditto.
237 Maximinus, ditto.
238 Balbinus, ditto.
— Pupianus, ditto.
244 Gordians, ditto.
249 Philip, ditto.
251 Decius, ditto.
253 Gallus, ditto.
— Emilianus, ditto.
260 Valerian, ditto.
Gallienus, ditto
270 Claudius II., died of the plague.
275 Aurelian, murdered.
276 Tacitus, ditto.
— Florianus, ditto.
282 Probus, ditto.
283 Marcus Aurelius, killed by lightning.
284 Numerianus, murdered.
285 Carenus, assassinated.
293 Caurasius, ditto.

What a consequence of undue power! what a picture of depravity in subjects! what a lesson to ambition!

In 305, Diocletian and Maximinus resigned, and thereby escaped the fate of 24 of their immediate predecessors; —but in

310 Maximinus was put to death.
311 Maximinus Galerius died shamefully.
342 Maxentius, drowned.
337 Constantine, died.
340 Constantine II. killed.
350 Constans, murdered.
353 Magnentius, killed himself.
354 Gallus, murdered.
355 Julian, poisoned.
364 Jovian, died.

375 Valentinian, burst an artery.
376 Theodosius, murdered.
378 Valens, burnt.
388 Maximus, killed.
392 Valentinian II., strangled.
394 Eugenius, murdered.
395 Theodosius, died.
The empire was then divided.

The Greek phalanx consisted of 8000 men in a square battalion, with shields joined, and spears crossing each other.

Ancient soldiers were trained to fight with either hand.

A Roman legion consisted of 6000 men, divided in 10 cohorts, and every cohort into 6 centuries, with a vexilum, or standard, guarded by 10 men.

The Macedonian phalanx were 16 deep, with shields joined.

Among the early Romans, commanders of armies were called *Imperatores*, but when Cæsar became emperor, the commanders were called dukes, or lieutenants of provinces.

In a Roman army, the first line were *Hastati*, or young men; the second *Principes*, or middle aged; and the third *Triarii*, or veterans. The light troops, for skirmishing, were called *Velites*. The latter had bows and slings, and seven javelins. The former, a two-edged sword, buckler, and helmet.

Attached to every Roman legion was an ala of 300 horse in 10 turmæ. The commander of the legion was a prefectus; of the cohorts, a tribune; and of the centuries, a centurian. The standard was a silver eagle, on the top of a spear.

The Greeks and Romans had no standing armies in time of peace. In war, every citizen was a soldier.

The Romans had no titles. Scipio and Cæsar were simply so called. Titles began in the court of Constantine. The emperor of Germany first took the title of *Majesty*. Kings, till the 15th and 16th century, were called *Highness*.

The Eagle was the Imperial Symbol in Persia, Rome, and of Napoleon. It is now adopted by Austria, Prussia, and Russia.

The Romans deified their emperors, &c. by a solemn public ceremony, called an Apotheosis, in which the priests and heads of the state assisted in great pomp.

Roman names were Prænomens, Nomens, and Cognomens, as Caius, Julius Cæsar, or Publius Cornelius Scipio.

The candidates for the athletic games, in Greece, used to be dieted on new cheese, dried figs, and boiled grain with warm water, and no meat. The games were leaping, foot-races, darting, quoits, wrestling, and boxing.

The Romans had 327 public granaries, from which they distributed corn to the poor, at the cost of the public treasury; and they had no alms-houses or poor-rates. The Greeks had various charitable institutions.

The Romans lay on couches at their dining-tables, on their left arms, eating with their right.

In Greece it was the custom, at meals, for the two sexes always to eat separately.

The early Romans ate boiled grain; they had not the art of bread-making, and had no mills.

All ages have produced heroic women, but none a nation of Amazons.

The horrible punishment of crucifixion is still practised in some Mahomedan countries. The unfortunate victims often lived in torture for many days. All the characters of antiquity, who are lauded in history, indulged in this superlatively barbarous practice. Alexander, Cæsar, Augustus, Titus, all the Roman emperors, and the Mahomedan conquerors, often crucified their hundreds, and even thousands, at a time, and women were not exempt from this fate.

The wearing of rings is very ancient. It was prohibited in Rome to all mechanics, and men of mean condition, to wear rings of gold; so that, granting a license for any person to wear a ring, was as much as to make him a gentleman. The usage of sealing with rings is also of great antiquity.

The adoration, claimed by ancient kings, was that of kneeling and prostrating, as practised in many courts to this day. Alexander merely claimed this homage after the eastern fashion; and hence the railings of the Greeks.

The largest battering rams of the ancients were equal in force to a 36 lb. shot from a cannon.

The shield, the breast-plate or gorget, was extended to the body and limbs, as armour, and the helmet protected the head. The most savage tribes use shields, and often helmets. Shields were usually made of leather, but often of wood or metal. The Grecian was round, the Roman square. The helmet was provided with a vizor, to raise above the eyes, and a beaver, to lower for eating. The vizor, with grated bars, is used in the arms of nobility; the elevation, without bars, a knight; and the vizor, closed, an esquire. The armour, for the arms and shoulders, was called the *vambrace* and pouldron; for the thighs and legs, *cuises* and greaves; and, for the hands, *gauntlets*. Knights wore golden spurs; squires, silver ones. The armour, or mail, was called *chain*, if made of scales or network; or *plate*, if in small metal pieces.

The Saxons and Normans used long spears. The Greeks threw theirs. Spears were 6 yards long, and pikes 14 or 15 feet. Maces were originally clubs, used by cavalry, and fixed in their saddles. The Roman swords were from 20 to 30 inches. The broad sword and scymetar has lately been adopted.

Among the ancients, the balista discharged stones, and the catapulta arrows. They were equivalent to artillery, threw arrows half a mile, and stones 200 or 300 weight.

The following Paragraphs indicate that America has ancient claims, though without written history.

Humboldt found, in possession of the Indians on the Amazons, engraved green stones, exactly like the Ethiopian and Babylonian, or *Sabean signets*, described by Mr. Landseer. They are real Jade, perforated, and loaded with inscriptions and figures. They open new fields for investigation. Did the Amazons pass from Africa to South America? Rude figures, resembling the sun and moon, and different animals, are found also sculptured in granitic and other hard rocks.

The ruins of an ancient city, called Palaugal, of great extent and high finish, have been discovered by Goo Galindo, in a thick forest, near Poten, in the vicinity of the Missouri; and the neighbouring country is also filled with architectural works. These, and other remains in North America, and the city lately discovered in Guatamala, seem to prove revolutions of which we have no present suspicion.

In the plains of Varinas, South America, are found tumuli and a causeway, 13 miles long and 15 feet high, more ancient than the Indians. On the high rocks of Encaramada, are sculptured and painted rocks; and also others, on a large rock in the plains which the Indians say were made by their fathers when the great waters lifted their boats to those levels.

Humboldt states, that fragments of ancient painted pottery are found in the woods of both Americas, far from the residence of man, exhibiting crocodiles, monkeys, and some large quadruped.

The most remarkable monuments of Mexican industry is the Pyramid, or Teocallis, of Cholula; and of Peruvian, the Causeway of Paramo, resembling, in magnitude, Napoleon's road over the Alps. Of course, mountains are the originals of pyramids every where, and the intellect of a beaver invents of a causeway, without referring to Egypt or the Old World.

The ancient fortifications, found in the American forests, are judged, by the trees, to be much above 1000 years old.

The Stone-mountain in Carolina is a vast wall of stones, built by an extinct people.

ANCIENT HISTORY is considered as ending with the breaking up of the Roman empire in Italy, by the invasions of the northern nations, and the general confederacy of the various conquered nations. These severally set up for themselves in various governments, which remained unsettled till the age of CHARLEMAGNE, from which period, authors in general date the commencement of MODERN HISTORY.

Ancient History commenced, therefore, in the obscurity of tradition, between 1800 and 1500 B. C., and ended about the year 400 A. C., about 2000 years; and Modern began with Mahomet, or Charlemagne, and has lasted about 1200 or 1000 years, beginning almost in as great obscurity as ancient history, owing to general ignorance.

Of all subjects of horror, connected with the studied barbarities of the Romans, the extravagant spectacles at the Coliseum were the most disgusting. 100,000 spectators delighted in these gorgeous scenes of butchery. Titus opened it by the slaughter of 5000 animals, more noble than their butchers. The Arena was often planted as a forest, and filled with hundreds of lions, tigers, bears, &c. and the monster Probus made 300 gladiators fight till all were destroyed.

At Lillebone, in Normandy, a Roman amphitheatre, buried for 15 centuries, has been cleared, in which were sittings for 22,000 persons.

Though the language of the Romans continues, by the craft of teaching, to be made the scholastic language of the conquered people, even to this day, yet the Romans were mere *imitators* of the Greeks in arts, science, poetry, and letters, generally; and were *original* only in wicked foreign policy, in lust of conquest, in love of pillage, and in variety of crimes and turpitude. Pompey, Cato, Cicero, Seneca, &c. died violent deaths, the fate of all Roman eminence; and the most tranquil periods of 1000 years were under military governments of despotic rule, in which civil liberty, domestic comfort, and social security, were unknown.

Stamps for words have been found in Pompeii and Herculaneum.

There were lately discovered, at Canino, in the tombs of the Etruscan kings who flourished before the building of Rome, vases, armour, tripods, &c. all of exquisite workmanship, representing the games and exercises of a polished people.

MODERN HISTORY.

MODERN HISTORY is marked by the fall of the Roman Empire, and the rise of modern nations on its ruins, by the establishment of Christianity, by the conquests of the Mahomedans, or Saraceas and Turks, by the resistance of the Christians, by the wars between the Roman Catholic and the Protestant powers, and the discovery of America and the system of Colonization.

China has maintained its integrity for above 4000 years. The Chinese empire was, however, divided between 420 A. D. and 580, by an irruption of the Tartars into northern and southern empires. It was re-united in 580, and so continued till 905, when the Tartars again obtained part of the empire till 1249, and the Monguls governed the whole till 1368. The Tartars were then driven out, and a Chinese dynasty continued till 1644, when the Mant-chou Tartars overran the empire, and, after five reigns, continue, under Kia-King, to govern. Kien-loag reigned 60 years, in great estimation at home and abroad, and abdicated in 1796, in favour of his son Kia-King.

The Greeks knew nothing of the Chinese, and the Romans little, till Marcus Aurelius sent an embassy A. D. 166. In 530, the first silk-worms were brought from China to Italy. The Saracens penetrated into China, and actually took possession of Canton in 758; in 1200, Gengis-khan conquered, and added part of China to his vast empire. About 1500 European traders began to visit Canton. At least 30 different embassies have proceeded from Europe to Pekin, many of them spleudid and expeasive, but the Chinese government receive them only as representatives of kings, sent to do homage!

Hyacinthe, the chief of the Russian residency at Pekin, has compiled a regular History of China, from 2357 B. C. to 1633 A. D. aboat 4000 years.

Central Asia has been the prey of the Tartar races twice since the Christian Era, and once of the fanatic Saracens. First nnder the Caliphs in the seventh century, and under Genghis-Khaa and Tamerlane in the thirteenth and fifteenth centuries. Their descendants founded the Mogul Empire, which, after three centuries, was divided by its local Governors, aided by the agents of the British East India Company. Lastly, of the Turks, who spread themselves on all sides.

The Empire of Thibet, being inaccessible to foreigners, seems to be as old as that of China; and that of Japan, which prohibits foreigners, is of similar antiquity.

A female, Alia Byhe, governed the western Mahratta Provinces from 1765 to 1795, with unparalleled wisdom, justice, and activity. She lived as a widow from her twentieth year, and took the reigns of government on the death of her son, who became insane.

The flight of a country, in Asiatic wars, on the approach of an Indian Army, followed by its Beyds, Looties, and Piddarees, is called *Wulsa*. Its devastations are worse than a flight of locusts.

The Roman Empire fell by its own corruptions and weight. All mankind were opposed to its military despotism and plundering spirit, and the tribes beyond the indefinite boundaries of the Empire, in the aorth and east, succeeded eventually in driving in the Roman advances, and were led on by victory to peaetrate even to the centres of the Empire. The most distingnished of the leaders of these assailants were ALARIC, King of the Visogoths, from 400 to 410; ATTILA, King of the Huns, from 444 to 453, who called himself the Scourge of God; GENSERIC, from 450 to 460; ODOACER, from 460 to 465; RICIMERE, in 472; and TOTILA, from 545 to 553, five of whom captured and plundered Rome itself, and took ample vengeauce on its citizeas for the crimes of the Romans towards other nations, during the previous 1000 years. These leaders laid the foundation of that arrangement of the European nations, which has substantially continued for the last thirteen centuries.

Snch was the fate of the western or Enropean Roman Empire. The eastern, or Asiatic, nad African, distracted by factions, and weakened by divisions, sank between 630 and 700 before the arms of the Mahomedan Caliphs, and existed only by connivaace till the fifteenth century, when Constantinople and its dependant provinces were captured and desolated by the Turks.

Rome has, however, maintained nearly as efficieat an influeace in religion, and what is called learning, as in arms, almost to our own times. While its arms ruled Europe, its Bishops extended a spiritual influence, and, under the title of POPE, ruled Christendom from 606 till the age of Luther, and Calvin in the sixteenth century, and a large portion of Europe even to this day. In the mean time the Latin service of the church, and the unformed state of the dialects of nations, incidentally rendered Latin the language of learning; and, owing to fashion, and the craft of the vocation of scholarship, the language still continues to be a badge of former conquest, and intellectual bondage in nearly all European nations.

The last struggle to restore a free Government in Rome, was by Stefano Porcari, a noble, 1453. He and his friends were betrayed, taken, and executed.

Arabia never was conquered by any foreign nation. Its sands have been its security, and the poverty of the scattered people have offered no temptation. It was the native country of romance and superstition. In it Sabeanism or Star-worship prevailed for indefinite ages, till overturned by Mahomed, who was born at Mecca, in 569, the year after the Abyssinian invasion, called the War of the Elephant; in which the Arabs say the invaders were destroyed by stones from heaven, and a flood of the Red Sea. His father was Abdaliah, and his mother Amina, both of good family and great personal beauty. His grandfather, Motalleb, who took charge of him, died at the age of 110. His uncle, Abu Taleb, brought him up as his own son, and took him, with a caravan, to Egypt and Syria; and he afterwards served in a campaign under his uncle, who was the commander, and also guardian of the Caaba. At 25, he married Cadiga, a rich and noble widow, and lived in opulence. The religions of the Arabs were the ancient Sabeanism, Jewish, and Christian. At 40, he announced himself a prophet, and taught the Unity of God in opposition to the Trinity, and disclaimed the reverence which the Jews bestowed on *Esra*. His first converts were his wife, his cousin Ali, his servant Zeid, and Abu Bekr, a man of distinction, who made five proselytes. He now preached in public the belief and worship of one God, in the courts of the Caaba, and began to produce the Koran. He was joined by Hamza and Omar, but opposed by the Koresh or Sabean Priesthood. A deputation of 75 came from Medina, and acknowledged him. The Koresh now sought his life; and he fled, with Abu Bekr, to Medina, where 500 disciples met him. Here he adopted the kingly and sacerdotal office, established a mosque, and publicly preached. He banished 700 of his opponents, and buried 700 alive, chiefly Jews, seizing their wealth. He soon after had an engagement with 1000 of the Koreish forces, and defeated them in the battle of Beber, in 623; after which he had 1000 warriors, and fought the battle of Ohud, but was defeated; and Medina was besieged by 12,000, and defended by 3000. The besiegers being baffled, a 10 years' peace was concluded.

Two years after, he gained a victory at Muta, over a large army of the Eastern empire; and, in 629, with 10,000 men, took Mecca, and, destroying the 360 idols in the Caaba, consecrated it to his religion called *Islamism*. In another year, all Arabia yielded to his pretensions. He now marched, with 30,000 men, against the Eastern empire; and, securing peace by his approach, he returned to Medina, and performed the Pilgrimage of the Valediction, with a train of 114,000 believers. He was supposed to be poisoned by a Jewess, and died aged 63, in 632, at Medina. The Mahomedans regard him as a man adorned with every virtue, and as the greatest legislator the world has produced.

He was succeeded by Abu Bekr, the father of his second wife; and the Caliph advanced into Syria, while Caled pursued victory to the Euphrates. In 634, Damascus was taken; and, on the same day, died Abu Bekr, who bequeathed the Caliphat to Omar. Soon after was fought the battle of Yermouth, in which 150,000 Christians were slain, and all Syria now became Mahomedan. They now invaded Egypt; and, in 641, the standard of Moslemism was established through Egypt. In the north and east they overran Persia, Armenia, and Mesopotamia; but, in 643, Omar was assassinated in the Mosque, at Medina. Othman succeeded in 644; and his general, Abdaliah, subdued the north of Africa; but, in 655, he was killed in a rebellion in his palace, and succeeded by Ali, the second disciple, and vizier of Mahomet. The widow of the prophet headed a rebellion against Ali, and though she was defeated and taken prisoner, his reign was turbulent, and he was assassinated by a fanatic at Cufa.

In spite of their broils this Mahomedan, or Saracen Empire, was, in 70 years, extended from India to Siberia, and from Samarcand to the Atlantic; while, in 704, they became masters of Spain and Portugal, invading Sicily and even besieging Rome, and the empire exceeded, in extent, any recorded in history. In 760, Al Mansor removed the seat of empire to Bagdat; and, for 500 years, some of the Caliphs made amends to science and literature for the ravages of the fanatics who succeeded Mahomet.

In 637, the Mahomedans first entered Africa, under Omar. In 650, they invaded Barbary. In 710, they overran Numidia and Lybia. In 973, Nigritia; and, in 1067, Lower Ethiopia; extending their faith to the Equator.

Bagdat, the famous capital of the Caliphs, was founded in 762, by Al Mansor, near the scite of Seleucia, or New Babylon, on the Tigris, about 50 miles from Babylon the Great, on the Euphrates. Old Babylon yielded to New. New to Ctesephon. This to Almadayen, and this to Bassora and Bagdat, which

were successively built by Omar and Al Mansor. Harem divided the Empire among his three sons, in 809, giving to Al Amin, Irak, Arabia, Syria, Egypt, and Africa; to Al Mamun, Persia, Turkestan, Chorasan, and the East; and to Motassim, Asia Minor, Armenia, Georgia, &c. The two first quarrelled, and Amin was killed, but, in 833, Al Mamun died, and was succeeded by Motassim, who died insane in 842. In the mean time several distant governors made themselves independant, and the Fatimites, the Soffarides, &c. &c. superceded the Abasides till about 1050, the Caliph's temporal power was confined to Bagdat. In 1258 this famous city itself was taken by a Mongul Horde, and Motazem, the 56th Caliph, murdered. The Grand Seignor now assumes the title.

About 1180, Saladin assumed the title in that of *Soudan*, or *Sultan*.

The Crusades were a memorable instance of the ascendancy of priestcraft over the passions of mankind. About the middle of the 11th century, Christian pilgrims found access to the holy land so difficult, that all Christendom was aroused by Pope Urban II. to march under the banners of the cross towards Jerusalem. In the autumn of 1096, 200,000 of these fanatics advanced from all parts of Europe to Constantinople, under a priest of Amiens, called *Peter the Hermit*. On their route they killed all Jews; but the remnant who passed into Asia were exterminated by Solyman the Great. In the following year, no less than 100,000 horse and 600,000 foot passed the Bosphorus, led by Godfrey, Hugh, Raymond, Bohemond, and Tancred, who defeated Solyman, and an army of 600,000 Asiatics. In two years, they lost half a million; but, taking Jerusalem by storm, they put all (except the Christians) to the sword, animated to this deed by Peter. Godfrey was now made King of Jerusalem; and another army of 200,000 soon followed, but were cut off by the inhabitants of the countries through which they passed, as marauders, or destroyed in detail by Solyman. About 40 years after, the King of France and Emperor of Germany, accompanied by *St. Bernard*, passed into Asia with 300,000 frantic followers, but were overthrown by Saladin, who, having retaken Jerusalem, staid the flow of blood, and proclaimed free toleration to the Christians in 1187.

In 1190, the Kings of France and England, and Emperor of Germany, proceeded with nearly half a million of men upon a new crusade. The emperor was drowned; and though King Richard gained a victory over Saladin, he returned alone; and, in Austria, suffered a long imprisonment. In 1212, Baldwin set forth with another expedition; but, quarrelling with the Greek empire in his passage, he overthrew the government, and was made emperor. Afterwards John of Brienne set forth, in 1219, and, landing with 100,000 men in Egypt, took Damietta, but lost his army by an inundation of the Nile.

The last of these mad enterprizes was undertaken by *St. Louis*, King of France, who embarked with 200,000 men, conveyed in 1800 transports, under the banners of *the cross*, and, landing in Egypt, was defeated by the Saracens, and taken prisoner in 1250; and, though well treated, and liberated in 1270, he embarked again, and, landing at Tunis, he and most of his army perished by disease. It has been estimated that these religious wars cost Christian Europe forty millions of lives, while they deferred the progress of civilization, and conferred a ferocious military character on the age.

In the religious battles, in Spain, with the Moors, Alphonsus II., about 800, slew 70,000 Moors in one battle. No quarter was given by opposite religions!

At the battle of Tholosa, in Spain, in 1220, Mahomed Al Nahur, the Moorish Emperor, was defeated, with the loss of 150,000 foot, and 30,000 horse slain, and 50,000 prisoners, by Alphonsus IX.; in 1340, Alphonsus XI. defeated them again with the slaughter of 200,000. Modern battles, even the crowning victories of Napoleon, were mere skirmishes to these almost forgotten slaughters, recorded by Mariana.

Constantinople was taken by Mahommed II. with an army of Turks, Tartars, and Asiatics, on May 29, 1453, and the Emperor Constantine Paleologus killed in the breach. There have since, or, in 377 years, been 24 Turkish Emperors, reigning, on the average, 16 years, distinguished by their despotism, slaughters, and bad government.

Athens, with 200 other Christian cities, were, in 1455, united to the Ottoman Empire by Mahomet II.

The Turks live in fear of a silly prophecy, that all the countries which they occupy are to be restored to the Christians, some Friday between 11 and 1 o'clock.

The Turkish empire, like all others of undue extent, is rapidly falling to pieces. Constantinople is held on mere sufferance, owing to the jealousies of the Christian Powers. But Africa is quite independant, and the Bey of Egypt has carried war through Syria into Asia Minor, having taken Acre, Aleppo, &c. Algiers is French, Greece is free, and the provinces on the Danube are Russian,

The renown of Charlemagne arose from his extending the dominion of the church, so that the priests gave out that Heaven fought on his side, and the poets and chroniclers, chiefly priests, held him up as a supernatural hero of romance. It was the same with the Norman Roland; in other respects, a common character.

The Venetians, for two centuries, were the bulwark of Christendom against the Turks. They were the frontier power, and their colonies were objects of Turkish ambition. Among other events of these wars was the Siege of Candia, which lasted 25 years, suffered a close blockade of 13 years, and open trenches 2½ years. It was surrendered, on honourable conditions, Sept. 27, 1669, and 30,985 Christians, and 118,574 Turks had been killed and wounded in 56 assaults of the Turks, in 96 sorties, in the springing of 1645 mines, and in the discharge of half a million of cannon-balls.

These wars, and loss of territory, with the discovery of the maritime passage to the East Indies, ruined Venice and Genoa, which, till then, had been the carriers from Alexandria and Rosetta, and the centres of the commerce of Europe.

The confederated Hanse-Towns were their rivals in the Eastern Seas, and not less powerful as centres of credit, confidence, and circulation, created by the operations, not the mere profits, of commerce.

The battle of Marignano, between Francis I. and the allies of Max. Sporza, was fought in 1515, when the latter were defeated with the loss of 20,000 men. But, in 1525, Francis I. was taken prisoner at the siege of Pavia.

The kingdom of Poland rose to distinction under the Jagellan Dynasty, between 1320 and 1580.

Muscovy was a province of Tartary till 1500; and the Muscovites are known only as a tribe.

Prussia was a province of Poland till 1600. In 1773, 1793, 1795, and 1815, Russia, Austria, and Prussia confederated to seize on parts of Poland, and in 1831, the Emperor of Russia, in defiance of treaties, overran and transplanted as slaves, the remnant of the Polish nation, extending the Russian dominions into the heart of Europe.

The settlement and conquest of America from the simple and divided natives is a great feature of modern history. Gunpowder and discipline enabled mere companies of unprincipled Spaniards to commit unparalleled slaughters, under Cortez in Mexico, Pizarro in Peru, and Alvarez in Chili, in the reigns of Charles V. and Phillip II. who, for gold, connived at enormities, which the priests sanctioned because the natives were not Christians. In this way, and by slavery in the Mines, millions were rapidly sacrificed, and, to supply their places, Africa was robbed of its unoffending population. The English settled in thinly-peopled North America, the Portugueze in Brazil, and the French in Canada, with little regard to the previous rights of the helpless natives, but with oppositions less powerful or neutralized. At length the colonies became too powerful for their European parents, and this age has seen the vast republican union of the states of North America, the republics of Mexico, Guatamala, Columbia, Peru, Chili, Bolivia, Brazil, and Paraguay established, as future objects of historical detail.

The Mogul empire was divided into districts, governed by *Soubahs*, and these into local jurisdictions, governed by *Nabobs*. The empire fell, when these aimed at independence, and of their conflicts the East India Company took advantage, and made nearly the whole dependant or tributary. This was the basis of the English empire in India, now so vast and promising.

The Buccaneers were European pirates, who, in the American seas, sought to divide with the Spaniards the wealth which they had plundered from the native inhabitants of Mexico and Peru. The vast extent of unoccupied coast afforded secure places of rendezvous, and their desperate courage made them masters of those seas. The first of them, whose exploits are recorded, was Pierre Frank, a Dunkirk man. The second was Bartholomew, a Portuguese. The third was Montbar, a Frenchman, and he was stimulated by detestation of the Spanish atrocities, more than by the love of plunder, and was, by the Spaniards, called their exterminator, for he never spared them, and never relaxed in his enterprizes. The next was L' Olonois, who, in like manner, carried on an exterminating war, in which he attacked the Spaniards in their forts and towns, till he was killed. The last was Morgan, commonly called Sir Henry, and he contrived to organise an immense piratical force, taking Porto-Bello, and marching with a land-force, and taking Panama, which he burnt. Their prize-money was so considerable, that adventurers joined them from all parts of Europe, and they became as terrible in the Peruvian Seas as in the Mexican; but, in the beginning of the last century, the maritime powers found it their common interest to put them down, for the commerce of all countries suffered by the Spaniards in their own defence, as well as from the Buccaneers, who

did not confine their attacks to Spanish vessels whenever a rich prize offered.

The Succession War, from 1702 and 1713, arose ont of a question whether an Austrian or a French prince, grandson of Louis XIV. should succeed to the throne of Spain. Our William III. organized a confederacy to oppose Louis, but the Allies, after obtaining great victories at Blenheim, &c. &c. withdrew one after another, and the French prince succeeded.

The French Revolution of 1789 was the re-action of public common-sense, on the absurdities of worn-out power in the French court. From 1789 to 1792-3 it was the triumph of benevolence and reason, but these being utterly at variance with the crafts in other parts of Europe, and the various usurpations of the feudal system, these united as one soul to destroy or confound what threatened to destroy them. The contest was the most memorable and bloody in the history of the world. It lasted from 1793 to 1815, and ended in an inglorious triumph of courts and courtiers over an illegitimate child of the revolution; but, oddly enough, the re-action, the cost, and the sacrifices, as completely destroyed the victors as though the decrees of the legislative assembly of France, in 1790, had had the force of European law. All the interests, professed to be protected by the war, have been totally sacrificed by its progress and results.

The constituent assembly of France sat from July, 1789, to Sept. 30, 1791. It was composed of 293 Clergy, 270 Noblesse, and 565 Third Estate. Its parties consisted of 322 Cote Droit or Tories, 480 Centre or Whigs, and 326 Cote Gauche or Radicals. Mirabeau was the first leader, and Barnave the second. Before their separation, they perfected a free constitution, and declared themselves ineligible to a seat in the next assembly. In August next year, the Thuilleries became the open rendezvous of the avowing enemies of the system. It was, therefore, attacked on August 10, and taken with the king and family. On Sept. 22, the Convention met, and, the armies of foreign despots being in France, the first act was to declare the abolition of royalty, and France a republic. The foreign kings then continued the war with various cessations till July, 1815, when the Bourbons were forced by the armies on the throne. Such is the history of the French Revolution, its wars, and the miseries brought on all Europe by a contest of principles.

In 1804, Napoleon had assembled 160,000 men, 10,000 horses, 17,000 sailors, and a flotilla of 1300 vessels, to invade England, from Boulogne, Wimereux, and Ambleteuse, but the expedition was baffled by Admiral Villeneuve sailing to the West Indies, instead of entering the channel. The English Government subsidized Austria and Russia, and the Army of Boulogne conquered Austria, and gained the victory over both at Austerlitz. The coasts of Kent and Sussex were also lined with martello towers and lines of defence, and nearly half the population formed volunteer corps. The question was the evacuation of Malta, agreeably to the treaty of Amiens.

In 1810, Napoleon was Emperor of France, King of Italy, Protector of the Rhine, with his brothers Kings of Spain, Holland, and Westphalia, and his brother-in-law King of Naples.

The Battle of Leipsic, fought in 1813, was lost by Napoleon, owing to a body of 30,000 Saxon allies turning on the French, in the heat of the battle.

The Battle of Waterloo was continued till night, by the arrival of 40,000 Prussians, under Bulow, about 4 o'clock, and was gained by a flank assault of 10,000 fresh Prussian cavalry, under Blucher, on the right of the French army, at 8 in the evening. The battle was fought on the previous position of the combined army, which was a plain, with a valley in front, and the two advanced positions, in the valley, were a farm-house, and enclosed yard by the road side, called *La Haye Sainte*, in the centre; and a chateau, with an enclosed garden and orchard wall, called ***Hougomont***, to the right. These, containing picked regiments, were taken by assault, with terrible mutual slaughter. The battle then took place on the ascents from the valley, and on the plain above, till the arrival of Blucher's cavalry, who, galloping through the valley, took La Haye Sainte, and placed the French on the heights between two fires.

The year 1830 was remarkable for three revolutions, that in FRANCE, July 27th, when Charles X. was expelled, and a Constitutional Government formed by LOUIS PHILLIPE, and the Chamber of Deputies: that in BELGIUM, in September, by which the Orange Family were driven into Holland, and a popular government established; and that in POLAND, in December, by which the Russians were expelled, and a popular government formed, but only for a time.

Russia, like the same Scythians and Tartars of old, still endangers southern civilization both in Europe and Asia. It can bring into the field half a million, or even a million of demi-savages, who, regarding their Emperor as a supreme being, execute any orders, and set no value on the arts which

adorn human nature in less savage forms. Assyria, Persia, Greece, Rome, and Roman Europe fell successively before these Northern barbarians, and such seems likely to be the early fate of modern Europe. Poland has already fallen, while Prussia, Austria, Germany, and Turkey are played off against each other, and are already within the grasp of the autocrat. Napoleon saw the danger, and sought to avert it in 1812, but all the rest of Europe were seduced to become the zealous allies of Russia in opposing him.

Vladimer, the first Grand Duke of Russia, was baptized at Chersonesus, in 988. The Kremlin, the splendid palace of Moscow, was built by an Italian architect, for Ivan III. between 1499 and 1508.

Mr. Tweddell asked Suvarrow his opinion of the massacre of Ismael, and he said he went to his tent and wept!

The first European settlement in Virginia was made in 1607; at New York, in 1609; and, in Massachusets, in 1620.

Penn's charter was dated March 4, 1681; and his first colony was 500 persons.

The Cape of Good Hope and the Canary Islands were discovered about	1405
Madeira was discovered in	1420
The Cape de Verd Islands	1474
The Bahamas, Hispaniola, and Cuba, by Columbus	1492
The Continent of America, by ditto	1494
Brazil	1500
Ceylon	1506
Madagascar	1507
New Spain, and the Straits of Magellan	1518
The first voyage round the world was completed in	1522
Japan was discovered	1542
California	1543
Virginia colonized by Raleigh	1584
Falkland Islands	1592
Hudson's Bay	1610
Louisiana	1633
Otaheite, &c.	1767

The Battle of Bunker's Hill, or Brad's Hill, took place June 17, 1775. On October 11, 1777, Burgoyne surrendered. October 19, 1781, Cornwallis surrendered. On November 30, 1782, the Independence was acknowledged. On March 4, 1789, Washington became first president. In 1797, J. Adams. In 1801, T. Jefferson. In 1809, James Madison. In 1817, James Monroe. In 1825, J. Q. Adams. In 1829, A. Jacksón.

Jefferson, J. Adams, Franklin, Sherman, and Livingston were the committee chosen to draw the American declaration of independence, on July 1, 1776. Jefferson and Adams were the sub-committee to prepare it, and Jefferson was its author; it was published on July 4. Jefferson and Adams died on its fiftieth anniversary.

The European nations have had in service the following armies:—Russia and Austria, 500,000 each; Prussia, 350,000; Great Britain, 300,000; France, 650,000; Spain, 150,000; Holland, 50,000; Bavaria, 50,000; Turkey, 450,000; Sweden and Naples, 40,000; Denmark, Portugal, &c. 25,000 each.

Great Britain has had 106 sail of the line in commission; France, 60; Spain, 50; Holland, 40; Sweden, 20; Denmark, 10; Russia, 30; and Turkey, 35; with three times the number of smaller ships.

It is estimated that, in the last 4000 years, the following number of the human race have perished by violent deaths in the field of battle, or have been slaughtered in the sacking of cities:—

Bacchus, &c.	*Millions* 15
Sesostris	15
Semiramis	10
Cyrus	10
Cambyses, &c.	25
Alexander	10
His Successors	20
Jewish Wars	25
Romans before Cæsar	60
Grecian Wars	15
Other Ancients	25
Twelve Cæsars	30
Roman Empire	60
Northern Nations	50
Middle ages	40
Crusades	40
Saracens	60
Reformation	30
Tartars	80
Turks	60
Chinese	100
French Revolution	60
American Wars	40
African Wars	100
Killed in Battle, &c.	980
Severely Wounded	2940
Famine and Suffering	2940
Millions	6860

At the rate, in 4000 years, of 1,715,000 per annum, or seven times the present number of the species.

Treaties and National Conventions in Modern History.

The Golden Bull	*Year* 1356
Treaty of Troyes	1420
Pragmatic Sanction	1439
League of Cambray	1508
Edict of Worms	1521
The French League	1576
Peace of Munster	1648
——— Breda	1667
Triple Alliance	1668
Treaty of Nimeguen	1678
League of Augsburg	1686
Treaty of Partition	1700
Methuen Treaty	1703

Treaty of Utrecht	1713
——— Aix-la-Chapelle	1748
Family Compact	1761
Peace of Paris	1763
——— Versailles	1783
Treaty of Pilnitz	1791
Partition of Poland	1795
Peace of Leoben	1797
Congress of Radstadt	—
Peace of Luneville	1800
——— Amiens	1802
——— Presburg	1803
Berlin Decree	1806
Peace of Tilsit	1807
Milan Decree	—
Treaty of Bayonne	1808
Peace of Vienna	1809
Treaty of Paris	1814
——— Ghent	—
Congress of Vienna	1815
Treaty of Paris	1817
——— Akerman	1826
——— London	1829

The ascendancy of Europe over the other three quarters of the world, in modern ages, has arisen from the discovery of gunpowder, made by a monk about 1300, and the only discovery traceable to that class. Its slow adoption by Asiatics, and its mystery to Africans and Americans, left the kings of Europe under no restraint but that of slender conscience. The invention of printing gave further impulse to the European mind, while the compass and navigation rendered all seas familiar to them. These have been followed by the steam-engine and its varied applications, and by chemistry, so as to raise civilized man above his original relations to nature. Then, in the science of society, *Civil Liberty* is an idea unknown in Asia and Africa, and scarcely known to the ancients. It is, however, now as to modern nations, what religion was in the tenth century, and deemed, politically speaking, of parallel importance. The Greeks enjoyed it, but abused and did not understand it, for the practical value of all popular influence in governments depends entirely on the *actual* way in which the general wish is expressed. If the *mass* of the people decide either in assemblies, as in Greece, or in elections, as in England, the system is erroneous and pernicious. The mass do not and cannot understand public questions, or the proper qualifications of statemen or legislators; and, if an hereditary aristocracy forms a senate, they should, at the same time, halve their own number, so as to enjoy equal intellectual respectability with the elected legislature. No man should elect to an office which he is not himself qualified by intelligence to fill, yet all the people, and the poorest as well as the rich, should vote, and even women, by deputy, when housekeepers. A rational system would be, for every ten to elect one to a district assembly for district objects, which all understand; then these should again decimate themselves, and the hundredth should elect members of the legislature, justices of peace, &c. from among themselves, by ballot.

ENGLISH HISTORY.

The name of England is derived from a village near Sleswick, called *Anglen*, whose population joined the first Saxon freebooters. Egbert called his kingdom Anglesland. Anglesey means England's Island, *ey* in Saxon being island.

The Anglo-Saxons came from the district watered by the Weser and the Elbe. It was inhabited by the Saxons and Angles.

The Celts were the ancestors of the Britons and modern Welsh, Highlanders, and the northern Irish. Of their origin nothing is known; but they were a distinct race from the Goths or Scythians, in language, religion, customs, and person. Their Druids had a great affinity to the modern Bramins in ceremonies and faith. The Welsh Archeology mentions the coming of Prydain and his three sons from Gaul; but it seems probable that, at a remote period, the countries were united. May not the Celts have been colonies from Atalantis, mixed subsequently with Phœnicians, Gauls, and Carthagininns?

The Celts or Cimbri were the first inhabitants of Britain, and the Welsh are their descendants. The Goths, or Scythians, drove them into their mountains, and the Welsh call themselves Kymri or Coomry. The Highlanders and northern Irish are the same people; but the southern and western Irish are from Gallicia and Carthage, and their language is the same as the Puuic. Whitehurst conceives that Ireland was a portion of the ancient Atalantis. The religion of the Druids, in many of its details, resembles that of the Hindoos; but the Gauls, or Gallicians of Ireland and the Highlands, were fire-worshippers, and perform ceremonies to Baal, or the Sun, to this day.

Colonel Wilford found, in the books in the Sanscrit, accounts of the White Island, and it is referred to as the residence of Vishnu; and he publishes another tract, descriptive of what is called the Churning of the Sea, such an event as would accord with the basaltic columns in the north, and, as, perhaps, absorbed Atalantis.—*Asiatic Researches.*

The earliest records of the histories of this island are the manuscripts and poetry of the Cambrians, who were the aboriginal inhabitants, corroborated

by their monuments, consisting of stone erections of temples and altars of worship, as Stonehenge, Abury, and various cromlechs; and also barrows, or tumuli, for burying the dead, often large and extensive.

These manuscrips shew, and the monuments confirm that, in a very remote age, a people *on or near the Euxine*, called Cymry, or Kimri, were conducted to Britain by Hu, called the Mighty; and that his son, Prydain, established laws and a government, and gave his name to the country.

Previously the country was covered with forests, like America at present, and inhabited by bears, wolves, wild boars, foxes, deer, and other wild animals.

The language of the first settlers was the same as that spoken in Wales at this day, of which the Irish, and Erse of the Scotch highlands, are dialects, similar to the Phœnician and Carthaginian, with many Greek words; and the religion was the worship of the sun and fire, such as practised in the countries near the Euxine.

The simplicity, perfection, and copiousness of the Welsh language, the altars still found in Ireland, dedicated to Baal, or the sun, the custom in Ireland and the Highlands of passing through fires at Midsummer, practised even to this day, just as among ancient eastern nations, are confirmations.

That Britain formerly joined the continent has been inferred from the similar cliffs of the opposite coasts of the English channel, and from the constant encroachments of the sea in still widening the channel.

The descendants of Hu and Prydain maintained the government, according to some writers, till the arrival of some bands of fugitive Trojans, about the years 1100 or 1200 B. C. under Brutus, who, landing at Totness, established a government; and, at his death, left England to his son Leucrine; Wales, to his son Kamber; and Scotland, to his son Albactanus.

This account seems, at first, to have been published by one Geoffrey, an historian, of Monmouth, from an ancient manuscript, said to be brought from Armorica, or Brittany, a colony from Britain. And it was confirmed by others, believed by Shakespeare, who founded on it his tragedy of *Lear*, one of the kings descended from Brutus, by Raleigh, and by Milton; also by Henry VII., who published his pedigree in a direct line from Brutus, in proof of his title to the throne.

The Trojan princes were contemporaneous with the British princes about 1000 years. The Romans governed 400; the Saxons about 600; and the Norman succession about 765 years to this time.

In 55, B. C. Britain was invaded in Kent by Julius Cæsar, who, after marching beyond the Thames, and building Dover Castle, withdrew the Romans.

During the Roman Conquests, Spaniards and Lusitanians fled to Ireland, and Gauls and Belgians to Britain; hence, there was always a foreign mixture with the natives; and, to this asylum, afforded to fugitives, is to be ascribed the subsequent Roman invasion.

Britain, at that time, according to Cæsar, or his editors, who wrote as enemies, was semi-barbarous; but it appears that they had war-chariots and arms, and fought with discipline and bravery, and had a body of priests, called druids and bards, by whom they were chiefly governed in 17 states or principalities.

Cæsar pretended that they had assisted the Gauls, with whom he had been at war; but the Welsh chronicles relate, that the British prince Caswallawn had landed in Gaul, and put 6000 Romans to death, in recovering a princess, named Flur, from Cæsar, to whom he had been betrothed.

Claudius, 98 years after, renewed the invasion, partly to employ the turbulent Roman soldiery, and partly owing to the treachery of a British Prince, Avarwy, son of Lludd, who invited and assisted the Romans.

The Romans divided Britain into four provinces:—

1. Wales, called *Britannia.*
2. South of the Thames, called *Britannia prima.*
3. The counties from the Thames to the parallel of the Humber and Mersey, called *Flavia Cæsariensis*. And,
4. The Northern Counties, called *Maxima Cæsariensis.*

They also occupied Scotland to the parallel of the Forth and Clyde, called Valentia. And further north, in the eastern half, were the *Picti;* and, in the western, the *Scoti;* who were identified with Hibernia or Scotia.

The wall of Adrian and Severus, built to prevent the irruptions of the Scots and Picts, extended from the Tyne to Solway frith, and was 80 miles long, 12 feet high, and 8 in thickness, with watch-towers.

In 207, Severus kept the imperial court at *Eboracum*, now York; and, in 312, the Emperor Constantine was born at York, his mother (Helena) being understood to be his father's mistress, and an inn-keeper's daughter at Colchester; for his father married in her life-time.

The Romans brought all their arts into Britain. They made straight military roads; built castles, temples, and

towns; recruited their armies; and advanced civilization many centuries, during their 400 years military domination.

About the Christian era, the language was probably Celtic, or that still spoken and written in Wales. In the north of Scotland lived a tribe of Norwegian settlers, who, continuing to paint their bodies after the fashion had ceased in the south, were, by the Romans, called *Picti*. The western islands and mountains of Scotland were peopled by a brave and high-spirited race from Ireland; but the Lowlands were occupied by a mongrel race of Scandinavians, Germans, run-away Britons, and others, constituting *the Scots*, needy, greedy, and glad to receive aid in their marauding excursions, from the hardy and barbarous Picts, who, it is stated by St. Jerome, were cannibals. Three hundred years before, Ireland had given them a king of the name of Fergus; but their savage annals exhibit little but a succession of assassinations and slaughters for many ages.

The Britons, or Cymri, occupied England and Wales, under the names of Leogria and Cambria. Ireland was peopled by a race who spoke the language of the Phœnicians and Carthaginians, the same that is still spoken in the Highlands in Scotland, and there called Erse or Irish.

Even in these early ages, the Phœnicians and other Mediterranean traders visited Britain for tin, and this metal first gave that coast an importance to the ancient world. But it seems to be agreed, as a general fact, that when the Trojans were dispersed, on the taking of their city, they colonized in other places, and one Brutus, a Trojan prince, landed with a fleet of adventurers at Totnes, in Devonshire, about the year 1100 B. C. It is then alleged that he conquered the country, and left it to a dynasty, who governed it in different tribes till the Roman conquest. Shakspeare's *Lear* was one of these kings; Lud, who founded London, is said to be another; and it is confidently asserted, that Brennus, who took and sacked Rome, at the head of a Gaulish army, in 385 B. C. was a British prince.

In Ezekiel, xxvii. 10, we find *Lud* named as one of the countries which supplied recruits to the Tyrian army 588 B. C. a circumstance rendered probable by the universality of their commerce.

The Irish claim descent from a colony from Causasus and Iberia, who first settled in Gallicia, and fled to Ireland, to escape conquest by Sesostris.

When Henry VII. had availed himself of the unpopularity of Richard III. to usurp the sovereignty, he employed a commission of learned Cambrians to prove his grandfather's (Owen Tudor ap Meredith) pedigree. This they effected through 100 generations, up to Brute, the Trojan king of Britain. First they traced him to Prince Lewelyn, and thence to Coel, king of Britain, whose line they traced to Rhegaw, daughter of Lear, and wife of Duke Henwin, and by ten other steps back to Brutus, whose name, say they, caused the country to be called Britain. His three sons—Locrine had Loegria, England; Kumber had Kumbria, Wales; and Albanactus had Albania, Scotland. They also proved that, in the 30th degree, Henry was, on his mother's side, directly descended from Ruthven or Vortigern.

The Druids of Wales were the priests, administrators of justice, poets, and instructors of the people. The bards were the poets, and the most learned among the Druids. The Romans and other intruders persecuted them, owing to their great influence over the people. Their colleges were called Bancor, and even the youth of Gaul received education at them. They met annually, in a sort of parliament, at Abre, Carn Bre, Stanton-Drew or Druid Lanidan, in Anglesey, &c.; and latterly at Caer Emrys, or Stonehenge, built by Ambrosius, about 460, on the site of a previous circle. They were fine poets and moralists; but they believed in elves, demons, charms, &c. Their moral maxims, inferior to none ever composed, were expressed in triads for ease of memory. Their chief poets were Aneurin, Taliesin, and Merdynn, or Merlin; and many of their productions have classical merit. The most noted bards were Plenydd, Alawn, and Gwron, and Britain was the source and head of the system. Its ultimate objects were to reform morals and customs, secure peace, and exalt virtue. They had three orders—presiding bards, orators or poets, and druids or instructors.

St. Pelagius was a Cambrian, of the name of Morgan, and his heresy arose from his mixing some of the tenets of druidism with christianism.

Ban, in Welsh, signified *high*, and *cor*, a circle or choir. Hence, Stonehenge was called Cor Gawr by the Welsh, (or stone-hung, or hanging stones, by the Saxons,) and Bancor, or Bangor, was the generic name for a principal church, of which they had eight or nine.

While the Romans governed, Latin was the language of the towns, of religion, law, and authority; and hence, when the Roman arms were succeeded by Romish priests, the language retained its ascendancy over vernacular dialects.

2 L 3

The Welsh Triads mention that Gavran went to sea in search of Gwerddoneau Llion, the Green Islands of the sea, in accordance with a popular tradition, that a Welsh prince sailed on a voyage of discovery, in an early age, and discovered America.

According to the Triads, Caer-leon-upon-Usk; Caer-Llundain, in Lloeger; and Caer-evrawg, in Deivr (York), were then the principal cities. The last, they say, was founded by Evrawg Gadarn, the sixth king of Britain.

The Triads mention Gwidiva, the son of Don, as a great astrologer, such as Woden was of the Don, and his character is there assigned to that god of the Saxons. In another, he is described as a man of illusion, and classed with Menew, the son of the three Cries, or Vedas, and with Rhudd Lwm, a giant.

The preservation and publication of the Cambrian records of British history were effected at the sole expence of Owen Jones, a plain furrier of Thames-street, and edited, in 1800, by Dr. Owen Pugh.

In the sixth century, the district of Gwaelod, between Merioneth and Cardiganshire, containing 16 towns, and the harbour of Gwythns was overwhelmed in a storm, owing to neglect in preserving the ancient embankments.

Armorica was granted, in 384, to Canou, by Maximim, for his aid against Gratianus. Cadwallader fled there, and afterwards to Rome, where he became a monk in 680.

The British lady, Claudia, to whom Martial addressed two or three of his Epigrams, and others to Linus and Pudens, is supposed to be the very Claudia mentioned with Pudens and Linus, in Paul's second Epistle to Timothy. She is believed, by Cambrian writers, to be of the family of Caractacus, and, perhaps, the first British christian. In 51, Caractacus was overcome; in 62, Paul was at Rome; and, in 67, murdered by Nero; and, in 90, Martial died, at 75. Her Cambrian name, as translated, would be Gladys Ruffyth, for Martial addresses her husband as Pudens, and Rufins on their marriage; and he also addresses two or three of his Epigrams to Linus, proving the connexion of the three, all of whom are mentioned by Paul as his friends.

The Britons had annual meetings at Abury and Stonehenge, where laws were made, and justice administered, and heinous crimes punished, by burning in wicker baskets in presence of the people. The Saxons had similar meetings of the *Michel-synoth*, or the *Michel-gemote*, or great council; and *Wittena-gemote*, or meeting of wise men.

The name Caledonia is believed to be derived from Gael, or Gael-men, or Gadel-doine, corrupted by the Romans.

The Grampian Hills are famous for a battle between the Scots and Romans, under Galgacus and Agricola, in which the former were defeated, with the loss of 100,000 men.

The spot in Anglesea, where Suetonius and his barbarous legions butchered the unoffending Druids, is still shown at a ferry called Porthamel, across the Menai Straits.

The success of Arthur, a British prince, against the Saxons, in twelve pitch-battles, is recorded by Hennias, Gildas, and others, independent of Geoffry of Monmouth and the romance writers. He is also mentioned in Ossian, as an ally of Fingal. He flourished between 508 and 540. In 1189, Henry II. found his body, and that of his queen (Gueniver) at Glastonbury.

In religion, the Britons were Deists, or disciples of the Druids; the Romans introduced the Gods of the Grecian Mythology; the Saxons were idolaters, and called the days of the week after the objects and gods of their worship. In 597, Pope Gregory sent Augustine to preach christianity in the south, and Panlinus in the north. It spread till Adelfrid, king of Deïri, or Northumbria, which included *Maxima Cæsariensis*, sustained the Saxon religion, and made conquests on all sides, slaying no less than 1200 monks, in a battle near Chester. Being afterwards defeated and succeeded by Edwin, he became a convert to Paulinus; and, after struggles for a century, christianity prevailed.

The Saxon encroachment was marked by the same treachery as that with which all people are treated, who confide in foreigners. Hengist got footing in Thanet, and he played off the jealousies of the chiefs against each other. He married his daughter to Vortigern, and finally, like Mourad Bey in Egypt, he murdered all the chiefs at a banquet, at Amesbury. The Britons, however, continued the war for nearly 200 years, till the Welsh were driven across the Severn, where, to this day, they call the English Saxons, and the common people are not reconciled to them. In relation to this affair, Winsemius, the historiographer of Friesland, relates gravely, that kissing was unknown in England till the fair Princess Rouix, (our Rowena,) daughter of King Hengist of Friesland, pressed the beaker with her *lipkens*, and saluted Vortigern with a *husjén* (a little kiss).

The Saxons had a nobility called Thanes, or Eoldermen and Eorls, and there were greater and less Thanes. The people were yeomen, or independ-

ent farmers, while the mass of the commons were slaves, and bought and sold with the land, being treated like the modern negroes. The wittinagemot was a sort of annual parliament, for public purposes. There was also a shire-mot twice a year, in which our assizes originated; and a wapontak or hundred-mot. Below all, a tithing of ten families.

In 628, the first stone church was built by Edwin, king of Northumbria, at York, which soon after was covered with lead, and then glazed. Till then, houses and buildings were of wood, or plaster, or mud. The building of Wearmouth Abbey, soon after, led to the bringing of glass-makers from the continent.

Edwin, king of Northumbria, in the 7th century was the precursor of Alfred in the 9th, and an exemplary improver and meliorator. His coinage is still in existence; and, though he improved Yorkshire, yet, so late as the reign of Edward III. there was no recorded town in the now saturated county of Lancashire.

Wakes and annual feasts were established by the Saxons, in celebration of the Saint's-day of their parish-church; and market-towns were then designated as such.

Hunting and fighting were the business of the Thanes and Ceorles under the Saxons. Every freeman was a soldier, and the working classes were slaves.—The Saxons were so called from their battle-axes, or *seaxis*.

The native peasantry were so commonly sold for slaves in Saxon and Norman times, that children were sold in Bristol-market, like cattle, for exportation. Their beauty, on being carried to Italy, is spoken of by Roman writers.

Edmund Ironside and Canute settled their quarrels as all kings ought. They met to fight in single combat, in the Isle of Alney, near Gloucester, and, after a few blows, they shook hands, and agreed to divide the subject of contest, (the kingdom of England,) Edmund taking the sooth, and Canute the north.

In spite of its insular situation, Britain appears to have been conquered by the Trojans, about 1,100, by the Romans about 45 A. C., by the Saxons about 456, by the Danes in 1014, by the Normans in 1066. For four centuries it was involved in wars with France, owing to feudal questions between that Court and the Dukes of Normandy.

The different tribes of Saxony invaders divided England into seven distinct governments or kingdoms, called the *Heptarchy*; between which, wars prevailed for three centuries, till Egbert, of Wessex, united the whole, in 827. These kingdoms were Kent, the South, the West, and the East Saxons, Northumbria, the East Angles, and Mercia. Kent, the first, was established by Hengist in 455; and Mercia, the seventh, in the Midland Counties, about 585. Hence, the Heptarchy lasted about 243 years, and the kingdom of Kent 372 years.

Hengist, Ælla, Uffa, Crida, Erkenwin, Ida, and Cerdric, were the several founders of the Heptarchy, and the history of these states was characterized by blood and rapine.

Between 993 and 1014, the Danes and Normans, under Sweyn, effected a conquest of England, and for 30 years exercised uncontrolled dominion and oppression. On a division of their monarchy, their brutal Hardieanute was superceded by Edward the Confessor, a Saxon Prince, a priest-ridden, superstitious, weak prince, brother and successor of Edmund Ironside. Edward had no children; and Edward, a son of Edmund, his nephew and heir-apparent, dying in his old age, and leaving a son, Edgar, under age, while two turbulent sons of his sister, Harold and Tosti, were all-powerful, he made a will in favour of William, Duke of Normandy, whom he had entertained a few years before at his coort. Harold, setting aside Edgar, Edmund's son, seized the crown, and hence a division in the country facilitated the conquest by William.

William the Conqueror was seventh in descent from Rollo, the Danish pirate, and a natural son of Robert the sixth Duke, by Hariotta, a girl of loose character.

The Bayeux tapestry, wrought by Matilda, wife of William the First, representing the circumstances attending the invasion of England, is 214 feet long, and 19 inches wide, divided into compartments, representing the train of events from the signature of the will of the besotted Confessor, down to the crowning of William, and is still preserved in the Royal Library, at Paris.

Egbert, who united the heptarchy in one sovereignty, in 827, was of Saxon lineage.

In 190 years, or 1017, Canute, the Dane, succeeded Edmund Ironside to the whole kingdom.

But in 24 years, or 141, a Saxon king, Edward the Confessor, succeeded Hardicanute.

Again, in 25 years, in 1066, William, bastard son of Robert, Duke of Normandy, succeeded to the throne of England.

And in 88 years, in 1154, Henry II. the first Plantagenet, succeeded to England, Normandy, and all the north-west of France, and restored the laws of Edward the Confessor.

In 245 years, or 1399, the lineal descent was broken by Henry IV. Duke of Lancaster.

And in 62 years, or 1461, the succession was restored by Edward IV. Duke of York.

In 24 years, Henry of Lancaster married the daughter of Edward IV. and united both families.

In 117 years, or 1602, died Elizabeth, the last of the Tudors, and the Scottish Stuarts, descended from Henry VII. succeeded.

In 112 years, or 1714, the Guelphs, of Hanover, descended from James I. succeeded Anne, the last of the Stuarts; and, in 1833, continue on the throne, in the person of William IV. who began his reign June 26, 1830.

Kings and Queens since the Conquest.

	Born	Began their Reign.	Reigned.			Age.
William I.	1027	1066 Oct. 14	20	10	26	60
Will.Rufus.	1057	1087 Sep. 9	12	10	24	43
Henry I.	1068	1100 Aug. 2	35	3	29	77
Stephen	1105	1135 Dec. 1	18	10	24	49
Henry II.	1133	1154 Oct. 25	34	8	11	55
Richard I.	1156	1180 July 6	9	9	0	43
John	1165	1199 April 6	17	6	13	50
Henry III.	1207	1216 Oct. 19	56	0	28	65
Edward I.	1239	1272 Nov. 16	34	7	21	67
Edward II.	1284	1307 July 7	19	6	18	43
Edw. III.	1312	1327 Jan. 25	50	4	27	65
Richard II.	1366	1377 June 21	22	3	8	33
Henry IV.	1367	1399 Sept. 29	13	5	20	46
Henry V.	1389	1413 Mar. 20	9	5	11	33
Henry VI.	1421	1422 Aug. 31	38	6	4	49
Edward IV.	1442	1461 Mar. 4	22	1	5	41
Edward V.	1471	1483 April 9	0	2	15	12
Richard III	1443	1483 June 22	2	2	0	42
Henry VII.	1456	1485 Aug. 22	23	8	0	52
Hen. VIII.	1492	1509 April 22	37	9	6	55
Edward VI.	1537	1547 Jan. 28	6	5	8	15
Mary I.	1516	1553 July 6	5	4	11	42
Elizabeth	1533	1558 Nov. 17	44	4	7	69
James I.	1566	1603 Mar. 24	22	0	3	58
Charles I.*	1600	1625 Mar. 27	23	10	3	48
Charles II.	1630	1660 May 29	24	8	7	54
James II.	1633	1685 Feb. 6	4	0	7	67
Mary II.	1662	1689 Feb. 13	5	10	15	32
William III	1650	1689 Feb. 13	13	0	23	52
Anne	1665	1702 Mar. 8	12	4	24	49
George I.	1660	1714 Aug. 1	12	10	10	67
George II.	1683	1727 June 11	33	4	14	77
George III.	1738	1760 Oct. 25	59	3	4	82
George IV.	1762	1820 Jan 29	10	4	28	68
William IV.	1764	1830 June 26				

* The two Cromwells from Jan. 1649, to May, 1660.

After the battle of Hastings, a list was taken of William's chiefs, amounting to 629, and called the Battle Roll; among whom the lands and distinctions of the followers of Harold were distributed. The northern counties held out; and York was defended, but taken, its defenders put to death, and the whole country devastated, many ancient towns being utterly destroyed.

The Normans, or North men, from whom our English nobility claim descent, were northern pirates, who, about the middle of the 9th century, infested the coasts of England and the English channel, and at length made landing in Neustria, and wasted the country, three times besieging Paris. At length, Charles the Simple, in 912, entered into a treaty with Rollo, their chief, giving him his daughter in marriage, and settling upon him the province then first called Normandy, with the title of duke, requiring him to do homage for it. Rollo was then baptized by the name of Robert, but known to the Normans as Haro, or Ha Row. He was succeeded by his son, Richard I.; he by Richard II.; he by Robert II., who, by Herleve, or Herlot, a mistress, had the bastard William, who conquered England.

17,000 acres were added to the New Forest in the reign of William I.

The tyrant, William I., to preserve his game, made it forfeiture of property and imprisonment to disable a wild beast; and loss of eyes for a stag, buck, or boar. Of these laws, the clergy were zealous promoters; and they protested against ameliorations under Henry III.

The curfew was a law only till the accession of Henry I. Since that time, the 8 o'clock evening-bell has been a custom only. Henry, at the same time, voluntarily proclaimed the first charter of liberties, which was confirmed by Stephen and Henry II., but neglected till extorted from John.

Wales continued a separate sovereignty till Edward I., in 1283; and Scotland till its king succeeded of right to both kingdoms in 1603. Ireland was invaded by Henry II. in 1172, but never quite conquered till the time of Cromwell. The legislatures of England and Scotland were united in 1706; and, of Great Britain and Ireland, in 1800.

The first summonses for calling a parliament, under the Normans, were in the 49th of Henry III.

The English princes gained bloody victories at Cressy, Poictiers, and Agincourt; but they were finally driven out of France in the reign of our Henry VI., and lost Calais, by surprise, in the reign of Mary. It was to the English people a fortunate loss; but

the rival policy of the two governments have, even since then, caused half as many years of war as of peace.

Wat Tyler's rebellion took place in 1369, and Jack Cade's it 1450. Both began in Kent, were very fatal to London, and terminated by the death of their leaders. But one paved the way for the dethronement of Richard II., by his cousin, Henry Duke of Lancaster; and the other to the destruction of the House of Lancaster, or the Red Roses, by their cousins of the House of York, or the White Roses. The first battle was at St. Albans, in 1455, and the last at Tewkesbury, in 1471; and, in the 16 years, above 30 great battles were fought, the country half depopulated, and nearly the whole of the nobility exterminated. In this war the nobles, to seduce their vassals to join their standards, emancipated them; and, in 30 years after, the statute of alienations enabled the commoners to purchase land, and gave a new character to society.

Edward III. had many sons, among whom were, the Prince of Wales, the Duke of York, and the Duke of Lancaster. The Prince of Wales died before him; and he was succeeded by his minor grandson, Richard II., who became unpopular, and banished his cousin Henry of Lancaster. Henry returned and headed malcontents, who, on dethroning Richard, made Henry king, in prejudice of the Duke of York and his branch, who yielded to the succession of Henry V. and VI. The latter married Margaret of Anjou, who quarrelling with the then Duke of York, grandson of Edward III. a contest ensued, and the duke, and one of his sons, were killed at Wakefield. His sons fled, found partizans, and the war continued till the Lancastrians were destroyed; and the brothers, Edward IV. and Richard III., successively filled the throne. Henry VII., who killed Richard in 1485, was great-grandson to Lionel, a fourth son of Edward III.; and his mother was widow of Henry V., but she had him by a second husband, of the name of Tudor. To remove doubts, he married the daughter of Edward IV., and, though he behaved very ill to her, had by her two sons, Arthur, who died before him, and Henry VIII. Henry had also a daughter, Margaret, who was married to the King of Scotland; and, on his grand-children dying without issue, her descendant, James VI. of Scotland, succeeded to the crown as James I. of England; and, from a daughter of his descended the House of Hanover.

The Guelphs succeeded to the English throne by Act of Parliament, as Protestant descendants of Elizabeth, the daughter of James I. married to Frederic Elector Palatine, whose daughter Sophia married Ernest Augustus, Bishop of Osnaburgh, afterwards Duke of Hanover, who, in 1692, was created ninth Elector of the German Empire.

Adrian IV. permitted Henry II. to invade Ireland, on condition that he compelled every Irish family to pay a carolus to the Holy See, and held it as a fief of the church.

In 1290, the royal family of Scotland became extinct, and the rights of several competitors were submitted to the arbitration of Edward I., and he made his award in favour of John Baliol. The Scots were dissatisfied, and preferred successively William Wallace and Robert Bruce, which led to an invasion and conquest of Scotland by Edward. Fresh disturbances in Scotland led him to assemble an army at Carlisle, where he died, in 1307; but, in 1314, the defeat of Edward II. at Bannockburn terminated the war.

The battle of Bannockburn was fought on the 25th of June, 1314, between the Scots, under Robert Bruce, and the English under the young King, Edward II. The English crossed a rivulet to the attack, and Bruce having dug pits, which he had covered, they fell into them and were thrown into confusion. 50,000 English were killed or taken prisoners.

Agincourt is a village in Picardy, where Henry V. was intercepted with about 20,000 men, by 100,000 under the Duc d'Alençon, Oct. 25th, 1415. The French were defeated with the loss of 10,000 slain, and 14,000 made prisoners, whom Henry barbarously murdered, under a false alarm.

Fair Rosamond, the favourite of Henry II., had a son by him, William Longespee, Earl of Salisbury, who was a constant adherent of his brother, the tyrant John, and a man of great renown in the events of that turbulent age. He died in 1226; but his widow, not less remarkable for her personal deeds, lived till 1263, and died Abbess of Lacock.

The 3 bastard sons of John of Gaunt, by Katharine Swinford, were called Beaufort, from his castle in France, and made Dukes of Somerset and Exeter, and Marquis and Earl of Dorset.

England was under an interdict from 1207 to 1214. Archbishop Langton absolved King John, on promise that he should restore the charter of Henry I.; and John afterwards yielded his kingdom twice to the Pope. In 1215, the barons took the field at Stamford,

under Robert Fitzwalter, Baron of Dunmow, and all deserting John, he met them on June 15, at Runnemede, a meadow between Staines and Windsor, when the great seal was affixed to the charter, and 25 barons were elected to secure its fulfilment, and they were put in possession of the Tower of London. Twelve knights were also appointed to rectify the forest laws. John was so indignant, that he died in October, at Newark, as was said by poison, or of a broken heart. His son, Henry III., afterwards confirmed them in 1236 and in 1253, in Westminster-hall, with great solemnity. Edward I. did the same, before he could obtain supplies or service. There were, therefore, five charters—one of John, three of Henry, and one of Edward I., the same in spirit, but slightly varied in expression.

From the 12th to the 15th century, the barons of England were so independant of the sovereign, that they often made formal wars on each other; they tried causes and administered justice in the Barons' Court, in the great hall of their castles, and had prisons within them; and they even coined money. The Earl of Warrene held numerous manors in twelve different counties; and the sixth Earl of Douglas used to be attended by 2,000 horse. Barons at first sat in parliament to perform a duty as possessors of land belonging to the king; but Richard II. summoned them by writ, without reference to their lands; and made peers by letters patent, a practice which continues to this day.

£20 a year was the income of a knight; a baron's, 266*l*. 13*s*. 4*d*.; and, an earl's, 400*l*., in the 13th century. Their tribute, or relief, was a fourth.

Knights baronets, with male descent, was a contrivance of Cecil, Earl of Salisbury, to raise money for King James to reduce Ulster. The party applying were required to have 1,000*l*. per annum, to be of good birth, and to raise 30 foot-soldiers, and maintain them in Ulster for three years; or, as an equivalent, pay 1,000*l*. One hundred soon obtained the title; and the first was Sir Nicholas Bacon, of Redgrave, Suffolk. This title was extended to Scotland, for the purpose of settling Nova Scotia; and Sir Robert Gordone, of Gordon-stone, was the first baronet, in 1625; and these are called baronets of Nova Scotia.

Knights bannerets led their vassals to battle under their own banner; but knights batchelors were those who were commanded by a superior. The former were expected to bring 100 into the field.

Esquires were, among the Greeks and Romans, shield-bearers and armour-bearers, and called armiger and scutigerulus, from which last comes the word esquire. A British queen is recorded as marrying the *armigerum*, or esquire of her husband. Under Charlemagne they were called *Schildknappa*; then, by the French, *Ecuyer*; Anglicized, *Esquire*; and now conferred on all who have a good coat or a clean shirt.

Batchelor was a title of rank in the middle ages, between an esquire and knight, from *Bas Chevalier*.

A boor, in modern language, signifies any unlettered vulgar person; but under the Norman princes, this class, called *villains*, was divided into vassal boors and free boors; those who were sold with the land, and those who were free, to choose an employer.

To this day the distinction prevails in some countries, and particularly in Russia, where the vassal-boors are divided into classes, as boors belonging to the sovereign; mining boors, who are sold with the property; and private boors, who belong to the nobility, and perform the labour on their estates.

Chivalry appears to have emanated from the combats in amphitheatres, instituted by the semi-barbarous Romans. With greater propriety, men fought instead of animals; the combats were a species of boxing-matches, in which the parties were covered with armour, and provided with spears, swords, battle-axes, and maces. Tilts, justs, and tournaments occurred on the return of the crusaders from the holy wars. For 3 or 400 years they were the chief amusements of courts, and the successful combatants acquired celebrity, knighthood, and the favour of the ladies; their seconds or bottle-holders, they called 'squires. When public combats declined, successful knights travelled in quest of adventures, to correct injustice, and fight in the cause of the ladies; and the consequent follies gave rise to the novel of Don Quixote.

The king's tribute, or relief, by William I., was, for an earl, 8 war-horses, saddled and bridled, 4 hunters, and 1 palfrey, with armour and weapons. A baron paid half; a vavasor or squire, his best horse and complete armour; a farmer, his best beast; and tenants, a year's rent.

Edward II. was murdered in a solitary chamber, now shown at Berkeley castle, with the bed and pillows.

Richard II. was murdered in Pontefract Castle, in a room near the keep, whose walls are 8 or 10 feet thick, the

window and sides of which were standing in 1829.

Richard III. was killed at the foot of a declivity in the ground to the east of the well called Richard's Well, in Bosworth Field.

The bedstead and travelling treasury of Richard III. is still shown at Rothley, near Leicester. It was hollow, and full of gold pieces, not discovered till 120 years afterwards. His stone-coffin, and the skull of Wolsey, were for years in possession of Sir R. Phillips.

When William Rufus was shot in the New Forest, in 1,100, his body was picked up by an adjacent cottager named *Purkis*, a maker of charcoal, and he carried the body in his charcoal cart to Winchester. And at this day, the same family, still named Purkis, live as charcoal makers on the very same spot, and carry their charcoal once a week in a cart to Winchester. About 25 years since, the then Purkis sold to the editor of this volume the bridle on the king's stray horse, which they had preserved and shewn as a relic. It is a right-royal Norman bridle.

The order of Knights' Templars was instituted in 1123 and 1180; they settled in England, and acquired such immense property that it was seized in 1 Edw. II. and the order suppressed.

Before the reign of Edward I., there were 120 alien priories of Normans and Frenchmen, and often seized by the kings.

The fatal plague of 1,346 was said to have destroyed in christendom 23,840,000 persons. It originated in Cathay, in Western Tartary, and killed as it spread two of three, and as high as 19 of 20. Its symptoms were knobs and boils in the groin and arm-pits. In England one half were destroyed in 1348. The jews &c. were ignorantly said to have poisoned the waters, and numbers fell victims. In England it rained in the previous year, from Midsummer to Christmas.

The revenues of the 193 abbeys, dissolved at the Reformation, or general plunder, were 2,853,000*l.*, or 15,000*l.* each, on the average. The lands given to court favourites would, at this time, pay half the interest of the public debt.

At the time of the violent dissolution of the religious houses by Henry VIII., estates left to them, *in trust*, by pious persons, for the poor and sundry charitable purposes, worth a million per annum, and now worth 20 millions, were seized by the crown, and granted to the servile parliament, nobility, and courtiers; who, since that time, have continued to enjoy the same.

In 1544, the ferocious English army, under the Earl of Hertford, burnt every house in Edinburgh, and its suburbs; also Holyrood-house, and the palace adjoining.

The Spanish Armada, for invading England in 1588, consisted of 130 ships, of which 100 were larger than any before built. It conveyed 19,295 soldiers, 10,500 seamen, and 2630 brass cannon. They were to convoy an army of 34,000 men from the Scheldt, in flat-bottom boats. The English opposing fleet, of smaller vessels, was about 101 ships. The Armada returned by the Shetland Islands, and not more than half reached the Spanish ports.

Sorbiere, a traveller after the Restoration, preferred the Dover waggon to the stage, was two days going in the stage to Oxford, and had a first-floor in the Strand, at 5*s.* a week.

The battle of Culloden, in which the Guelphs, under William Duke of Cumberland, defeated the last of the Stuarts, took place in April, 1745, near Inverness. Nearly 3000 of the Scots were killed on the field, or barbarously slaughtered afterwards in the pursuit; while the executioner made terrible examples of many others. Prince Charles, after long wandering as a fugitive, escaped to France, and died at Rome, in 1788.

The Act of Union with Scotland was the 5th of Anne, cap. 8, and consisted of 25 articles, one of which provides that the land-tax of Scotland shall be but in a fixed proportion to that of England.

The Stuarts were a wrong-headed race, or had to rule a vicious people. James I. was assassinated; James II. was killed by accident; James III. was murdered; James IV. was killed at Flodden; James V. died of grief; Henry, Lord Darnley, was murdered; his wife, Queen Mary, was murdered by Elizabeth; Charles I. was beheaded; James II. died in exile; the Duke of Monmouth was beheaded.

From Fergus, the first Scotch king, to their James the 6th, and our *first*, there were 108 sovereigns, five subsequently of both kingdoms, and, since, the *soi-disant* James the 8th, Charles the 3d, and Henry the 9th. The scruples of George the 3d led him to grant the last a pension.

Archbishop Sharpe, after practising horrible cruelties on the Scotch Covenanters, was waylaid at Magus-muir Hill, by nine horsemen, who, having fired into the coach, in which rode the Archbishop and his daughter, he got out to crave mercy, but quoting his deeds, they killed him with their swords, in spite of the shrieks of his daughter. Russell, who gave him the

mortal blow, practised as a physician, in London, after the Revolution.

The *Book of Innocent Sunday Sports*, originally Catholic, liberally published by James I., on the principle that Sunday is a christian festival, so offended *the Puritans*, that its sanction by Cha. I. was a primary cause of the civil wars. The Puritans regarded Sunday the same as the Saturday of the Mosaic law, and adopting a Catholic festival as the real sabbath, insisted on keeping Sunday, the *first* day, just as the Jews keep Saturday, the *seventh* day, or the ordained sabbath of the fourth commandment. The liberal views of James and Charles did not, however, suit the religious prejudices of that day.

Magna Charta was a charter for the nobles, extorted from King John; and extended to the people by the petition of right conceded by Charles I., and by the bill of rights, 1688.

The power which the House of Commons possesses of granting or withholding subsidies or grants to the crown or executive power; and the indispensable assent of each branch of the British legislature in the enactment of laws, which govern the courts of law, and bind the people, confer an influence on that body which obliges the crown to compromise with majorities, by conferring on them the ministerial direction of the government. Hence, as these parties vacillate, changes of administration take place. Again, as the restoration in 1660 was the act of the people or their leaders, and, as the revolution in 1688 was also the act of the people or their leaders, so the crown, by policy and habit, yields to this influence, and changes of administration are evidences of the fluctuating ascendancy of parties. Since those periods, therefore, the changes have been numerous. The two parties in the aristocracy, are the *Whig* and *Tory*—those who would curb the power of the crown, and those who would curb the power of the people.

The first administration of Charles II. was a conciliating mixture of respectable republicans, and his personal adherents, while abroad, under Clarendon. It lasted till 1663.

The second was formed under the influence of the Duke of York, a zealous Papist, and lasted till 1670.

The third, called the *Cabal*, from the initials of their names—Clifford, Arlington, Buckingham, Ashly, and Lauderdale. Public crime and unprincipled policy was now at its height, and no man's life or honour was secure.

King James, in 1615, continued, with some additions, the administration of his brother.

King William, in 1689, established the first decided Whig administration. In 1690, he admitted Tories; and, in 1693, the Whigs were restored.

Queen Anne, in 1702, chose a Whig Administration till 1710, consisting of Lord Godolphin, Lord Somers, the Duke of Marlborough, &c. The Tories succeeded, under Harley, Bolingbroke, and the Clarendons.

George I., in 1714, chose a Whig administration; and the Tories were prosecuted.

George II. continued the Whigs in power; but a reforming party, led by Windham, Shippen, Hungerford, and Pitt, now appeared in Parliament. At this time, Whigs and Tories were considered as alienated from the interests of the people. In 1739, the Walpole administration yielded to a more popular Whig party; and, in 1744, other Whigs came into power.

In 1754, a mixed administration was formed under the Duke of Newcastle; but, in 1756, a change took place in favour of the Whigs, and the first Pitt became minister.

George III., in 1760, ejected the Whigs, and formed a Tory administration under Bute and Jenkinson.

In 1763, Grenville succeeded Bute; and his prosecutions of Wilkes, and plans of taxing America, changed the fortunes of the empire.

In 1765, the Whigs came into power under the Marquis of Rockingham; and, in 1766, a change of men took place, and Mr. Pitt returned to office.

In 1771, the Tory administration of Lord North was formed, and continued through the American war, till 1782, when the Whigs, under the Marquis of Rockingham, came into power. The death of the marquis occasioned a division of the Whigs, and a coalition of Mr. Fox, at the head of one division, with Lord North, at the head of the Tories, in 1783. Late in that year, the administration of the second Pitt was formed, and it continued on Tory principles till the French war in 1801.

In 1801, another Tory administration was formed under Addington.

In 1804, the Pitt adminsitration was restored. Early in 1806 Pitt died, and a Whig administration succeeded under Mr. Fox; but he dying in September, a Tory administration, under Perceval and Eldon, succeeded in the February following. Perceval was shot in 1812; but the same administration was continued by George IV., under Liverpool, till Liverpool's death, in 1827.

A mixed administration succeeded of Whigs and Tories under Canning, who died in the same year; and was succeeded by Lord Goderich and a Tory

party, and replaced, in 1828, by the Duke of Wellington, who, in 1830, was succeeded by Earl Grey and the Whig party.

The wars of England have seldom been waged for English objects. Under the Norman princes for Norman objects; and under the Hanoverian family, chiefly for Hanoverian objects. Elizabeth made war on Spain, to protect Holland and the Protestant religion. Charles II. on Holland, in return for the pensions paid him and his mistresses, by Louis the Fourteenth. William's wars were partly in defence of the Revolution, and partly for Dutch objects. Anne's wars were about a King of Spain, in which she did not succeed. Those of George II. were Hanoverian and colonial. Those of George III. to maintain a false principle of taxation in America, and to aid the Bourbons in France, in getting the better of their subjects, who sought the British system of civil liberty, and mixed monarchy.

The National Debt of 800 millions was generated by the following wars, which cost treble that amount:

1. In defence of the Revolution against James II., and in support of King William's continental policy, commenced in 1688, and ended in 1697.

2. To place an Austrian Prince, instead of a French Prince, on the throne of Spain, from 1702 to 1713, at Utrecht.

3. A West India war with Spain, in 1739, followed by a distinct war in 1741, about Austrian succession, ended at Aix-la-Chapelle, in 1748.

4. An American, and continental war with France, began 1756, ended at Paris, 1763.

5. A war with the American colonies, began 1774-5, ended 1782-3, at Versailles.

6. War against the principles of the French Republic, began 1792-3, ended in 1802, at Amiens.

7. War to resist the surrender of Malta, according to the previous treaty, begun 1803, and ended at Paris, in 1815.

To carry on these wars, the currency was depreciated; paper-money was invented, and the circulation increased from a few millions in 1688, to fifty millions in 1815, besides the circulation of inland bills and notes, for 4 or 500 millions; and, by this means, the taxes of less than two millions at the Revolution, were increased to seventy millions in 1815, and the annual public expences to 130 millions.

Private and local public obligations necessarily kept pace with the monetary operations of the government, and amounted to above 3000 millions; but, in 1826, the parliament suddenly arrested the general circulation, by which money was raised in value 50 or 60 per cent., and thereby thousands of opulent traders were ruined, public improvements stopt, and the flourishing commerce of the country rendered either stagnant or profitless.

From 1793 to 1805 is commonly called the *reign of Terror*. The court made war on the freed people of France, to uphold the Bourbons, and the independent people of England opposed a war for such objects. To coerce them, the Habeas Corpus act was repeatedly suspended, and numberless prosecutions and proscriptions enabled Pitt, Dundas, Canning, and the Court Party to spend 12 or 1500 millions, with a waste of life without parallel.

Such abuses and profligacy displayed the inadequacy of the House of Commons, and Peel's, and other laws, to restrain the currency, while the war-debts, public and private, remained, led to so unanimous a demand for a reform in the House of Commons, that its constitution, which had existed since HenryIII. and was palpably worn out, was, in 1832, superseded by *the Reform Act*, which has transferred the representation from baronial castles to large towns and counties, and conferred the elective franchise on householders, as well as on feudal privileges. The success of the measure is devoutly wished; but whatever it may be, nothing could be worse than a venal legislation, which levied taxes, made wars, and created sinecure offices for their own personal aggrandisement.—*See Law.*

England, in the scale of nations, was a secondary power till 1763. The conquest of Canada and the establishments in India, her naval superiority, her colonies, and her trade, raised her then to the first rank among nations. She suffered a deep blow, by the separation of the American colonies, and the expences of the war; but, in 1792, she had re-attained the summit of internal prosperity and foreign ascendancy. National pride, and the intoxication of power, led then to twenty-three years war, for no British object, and full 1500 millions were spent, for which she got from her own ally, the Cape, Ceylon, and Demerara, with Malta from the knights, Mauritius from France, and Heligoland from Denmark.

In the meantime, the expenditure of from 50 to 80 millions per annum, among merchants and manufacturers, and the creation of a funded interest, gave an artificial air of prosperity, which misled her agricultural population into delusive employments; the

war debts, therefore, now heavily press; exclusive discoveries in manufacturing are no longer exclusive; and decadence is visible in foreign influence, in financial power, and in the emigration of the efficient population to America and other rival states.

The agitation of the question of Parliamentary Reform began in 1778-9, with Saville, Wyvell, Cartwright, Tooke, and others. It was revived in 1783-4, by Pitt, the Duke of Richmond, Sharman, Sawbridge, &c. Again, in 1791, by Stanhope, Grey, Price, Priestley, Tooke, Hardy, Thelwall, Holcroft, &c.

In 1800, by Burdett, Waithman, Maddocks, &c. In 1808-9, by Burdett, Grattan, Cobbett, Hunt, &c. &c. In 1827, by Brougham, Attwood, Scholfield, Potter, Baxter, Waithman, Wood, &c. In 1830, by Grey, Russell, Althorpe, O'Connell, &c. In 1831, the Reform Bill was brought in, and, after above twelve months' debate, passed the House of Commons, but was rejected by the House of Lords. A new parliament was then called, and being again carried in the Commons, on the second reading in the Lords, on April 14, 1832, 184 peers voted for it, and 175 against it.

The free parts of the English constitution, and the securities of civil liberty, were procured by Magna Charta, in 1216,—by Simon Montford, Earl of Leicester, who obtained the first parliament in 1256—by the concessions of Edward I., in return for subsidies to sustain his wars,—by the Trial by Jury,—by the Petition of Right, drawn by Lord Coke,—by the Habeas Corpus Act, drawn by Lord Shaftesbury,—by the Bill of Rights and Act of Settlement,—by the Libel Bill of C. J. Fox.—by the Catholic Emancipation Bill,—and, finally, by the Reform Bill of 1832, planned by Lord Grey. The system would be perfect if sheriffs were obliged to summon juries in exact rotation from three districts; if elections were made by ballot, so as to render volition free, and bribery useless; and if members of municipal corporations were chosen by the inhabitant householders.

The English champions of civil liberty, since its object has been understood, were—Hampden, Pym, Fairfax, Hollis, Coke, Vane, Ludlow, Lilburn, Milton, Sidney, Russell, Marvel, Fletcher, before the revolution; and since, Locke, Burnet, Swift, Holt, Shippen, Glover, Chatham, Wilkes, Camden, Erskine, Sawbridge, Fox, Sheridan, Whitbread, Paine, Priestley, Price, Tooke, Stanhope, Perry, Belsham, Romilly, Wakefield, and Cartwright.

The best Reading Histories of England are those of Rapin, Hume, Smollett, Henry, Coote, and Lingard. Portions are Clarendon, Turner, Hallam, Belsham, Burnet, Ludlow, Lyttleton, and Spelman. The peculiar histories are Andrews, Enfield, Lloyd, Robertson, Milton, Anderson, Macauley, Plowden, Lawless, Walpole, Guthrie, and Whittaker. Then there are the Chronicles of Beda, Gildas, Geoffrey, Froissart, Baker, Stowe, &c.; besides county and local histories in immense variety.

In relation to manners, in England, in 1832, we may cite the great City of London festival, on Wednesday, July 11, to celebrate the reform and regeneration of the House of Commons. The guests were 1100 in number, including twenty-five peers, and 249 members of the Commons. The general bill of fare was as under:—

160 Tureens of turtle.
80 Dishes of venison.
84 Couple of chickens.
25 Hams.
80 Tongues.
20 Pigeon pies.
30 French pies.
36 Pieces of roast-beef.
40 Ribs of lamb.
42 Dishes of shell-fish.
4 Rounds of beef.
44 Fruit tarts.
42 Tourtes.
90 Marbrée jellies.
56 Italian creams.
24 Chantilly baskets.
24 Dishes tartlets, &c.
40 Salads.
40 Cucumbers.
40 Dishes peas.
80 Ditto new potatoes.
80 Ditto French beans.

Dessert.

160 Ice creams.
66 Pine apples.
100 Dishes hot-house grapes.
160 Ditto strawberries.
56 Ditto raspberries.
56 Ditto gooseberries.
80 Ditto cherries.
56 Ditto currants.
30 Dishes almonds and raisins.
40 Ditto rout-cakes and biscuits.
40 Ditto preserves and olives.
27 Savoy cakes, ornamented.

There were 300 dozen of champagne, hock, sauterne, claret, madeira, port, and sherry, consumed.

The Hermen-street, or *via militaris*, of the Romans, passes from Dover to London, and thence to the extremity of Scotland. In many places it is still the turnpike.

Edward I. first banished the Jews from England; but Cromwell permitted

their return. As they could hold no property in land, in any christian country, they became the universal exchange brokers, and dealers in money and government funds. They enable christian governments to borrow and to carry on wars. The Goldsmidts were the agents of the Pitt administration; and Rothschild, the modern Jew, is now necessary to all the governments of Europe, conferring on each, on due security, the monetary strength of the Jewish resources.

The first coinage in England was under the Romans, at *Camulodunum*, or Colchester; and forty varieties of it are to be found in cabinets. The Britons had no coinage, and, as a substitute for gross barter, paid metal by weight.

Before 1300, 11 oz. 2 dwts. of fine silver, and 18 dwts. of alloy, were equal to 20*s*. In 1412, the same was coined into 30*s*.; and, in 1527, into 45*s*. But, in 1545, 6 oz. of silver and 6 of alloy were coined into 48*s*.; in 1546, but 4 of silver and 8 of alloy into 48*s*.; and, in 1551, the 5th of Edward VI., but 3 of silver and 9 of alloy were coined into 72*s*. Elizabeth, in 1560, restored the old standard in 60*s*.; and, in 1601, in 62*s*. It is now 66*s*., of the same standard.

The pound sterling was, in Saxon times, a pound troy of silver, and a shilling its twentieth; consequently, above three times as large as at present.

Rents, down to the Conquest, and chiefly afterwards, were paid in kind,—as in honey, bread, ale, oxen, sheep, poultry, cheese, butter, and fish, equal to a 15th or 20th of the produce.

The first clothing fabrics in England were made in the reign of Edward III., and called Kendal cloth and Halifax cloth.

In 1253, wheat sold at 2*s*. 6*d*. per quarter; in 1272, a labourer got 1½*d*. per day; and a harvest man 2*d*. In 1256, brewers sold 3 gallons of beer for 1*d*. In 1248, the king paid 18*s*. 4*d*. for 37 sheep, or 6*d*. each.

In 1300, wheat and barley fetched 3*s*. 4*d*., and oats 1*s*. 8*d*. per quarter; a cow, 6*s*.; a fat sheep, 1*s*.; a hen, 1½*d*.; and a pair of shoes 4*d*. Labour from 1½*d*. to 2*d*. per day.

In 1314, parliament fixed the price of a fat ox at 16*s*.; a cow, 12*s*.; a fat hog, 3*s*. 4*d*.; a sheep, 1*s*. 2*d*.; a couple of chickens, 1*d*.; a goose, 2½*d*.; and eggs, ½*d*. per dozen. Arable land, in Kent, let from 3*d*. to 6*d*. per acre; pasture at 1*d*.; and meadow from 4*d*. to 10*d*.

In the middle of the 14th century, wine was 4*d*. per gallon; wool was 2*s*. per stone; Kendal cloth, from 3*s*. 4*d*. to 5*s*. per piece; wheat, from 4*s*. to 6*s*. per quarter. In 1500, oats were 2*s*. per quarter, and wheat 6*s*.; ale, 2*d*. per gallon. Labour, 2½*d*. to 3½*d*. per day.

In the 16th century, wheat averaged 21*s*.; and labour 8*d*. per day. During the civil wars, wheat averaged 3*l*. 12*s*. At the Revolution, it was 1*l*. 19*s*. At the Accession of George III., wheat was 33*s*.; barley, 20*s*.; and oats, 15*s*. Labour, 1*s*. to 1*s*. 6*d*. per day.

In the reign of Elizabeth, a house, in a country town, let for 4*s*. or 6*s*. per annum; and the purchase was 5*l*. or 6*l*. Wheat was 1*s*. a bushel; malt and oats, 7*d*.; an ox, 26*s*.; and a fat sheep, 2*s*. 10*d*. Claret, 2½*d*., and red port, 3*d*. a quart. Labour 4*d*. to 6*d*. a day.

In Queen Elizabeth's three months' tour, in 1572, she spent 107*l*. 103*l*. and 153*l*. per day in each month, in all 9200*l*.

It appears that the annual revenue of the crown-lands, between the Mersey and the Ribble, was, in the reign of Edward the Confessor, but 149*l*.16*s*.10*d*.; and, taken as crown-lands at 10 times too little, and money at 100 times greater worth, the whole was under 150,000*l*.; but it appears that the same tract, as returned under the property-tax in 1814, was worth 2,560,761*l*.

The Conqueror gave 398 manors to Roger de Poitou, who built Lancaster and other castles; but, rebelling against the tyrant, the whole were given to his son, William Rufus. They constitute the Duchy of Lancaster Estates, but are now much curtailed; but hence arose the great power of the Dukes of Lancaster.

Our ancient kings used to keep *jouglers*, or minstrels, and then jesters, under the Tudors; and James I. converted them into poet-laureates.

The seal of the Bull of Clement VII. confirming the title of *Fidei Defensor* to Henry VIII. is of solid gold, and preserved in the Chapter House.

Three swords are carried before the King at the coronation, the *curteyn*, which belonged to Edward the Confessor, thirty-two inches long. The sword of Justice to the *Spirituality*, forty inches; and the sword of Justice to the *temporality*, also forty inches.

Epsom Races are believed to have originated when the Court of James used to be kept at Nonsuch. James also established the races at Newmarket and Enfield. In 1603, James Lenton, one of the king's grooms, rode five times between London and York, in five days.

Saddles were not used till the third century.

In 1532, at Ely House, Henry the Eighth, the queen, ambassadors, lord-mayor, judges, barons, aldermen, &c. &c. were entertained. There were 24

great beeves, at 26s. 8d. a piece; an ox, at 24s.; 100 fat wethers, at 2s. 10d.; 34 porkers, at 3s. 6d.; 91 pigs, at 6d.; ten dozen of capons, at 20d.; capons of Kent, nine dozen and a half, at 12d.; coarse capons, 19 dozen, at 6d.; cocks of gross, seven dozen and nine, at 8d., coarse cocks, 14 dozen and eight, at 3d.; the best pullets at 2½d.; other pullets at 2d.; 37 dozen of pigeons, at 10d.; 14 dozen of swans; 340 dozen of larks, at 5d. &c. &c.

Archery meetings, so fashionable from Henry VIII. to Charles II., have latterly been revived in most counties. The gentlemen shoot 100 yards, and the ladies 60. Robin Hood, while dying, to fix his burial-place, shot two arrows, one a mile, and the last half a mile, where his tomb still stands, in the fine grounds of Sir George Armitage, near Dewsbury. He and the colossal John Naylor, (called little John) used to shoot a north-country mile, nearly equal to two statute miles.

When perukes were preferred to the natural hair, men had wiggaries just as they have wardrobes, with new and old wigs of various colours and fashions, for different humours or occasions. This fashion prevailed in England from 1670 to 1770, and even later.

From soles tied to the feet with strings, fashion passed to the buskin, and then to long-toed, or picked shoes, fastened to the knees with chains. Edward III. forbade them to be above two inches.

Cloth hose, like gaiters, were worn till 1530. Henry VIII. received the first pair of silk hose from Spain. Edward VI. was presented with a pair by Sir Thomas Gresham. Queen Elizabeth had a similar present, and James I. borrowed a pair of the Earl of Mar, to receive the Spanish embassy.

The ancient castle generally inclosed from five to ten acres of land; and had a river or ditch, commonly filled with water. On its verge was a wall, then another wall, a space between them being called the ballium. Within the second wall were apartments and storehouses for the garrison, and a citadel, or keep, placed on a high mound for further security; and there often were subterranean secret ways. Beyond the moat was the barbican, or watch-tower, and from it, across the moat, was a drawbridge raised inwardly. The entrance through the ballium was secured by gates, with a ponderous grating, or portcullis, which was raised or let down by iron chains running over pulleys. The walls were further protected by battlements and towers, and by loop-holes, to fire arrows through. All the walls were eight or ten feet thick, but those of the keep were fifteen or twenty; and, without artillery, they seemed unapproachable, and likely to surrender only from want of provisions. In some secure part, there were vaults for the security of prisoners. Probably, some of them were first constructed by the Romans, and others in the time of Alfred; but the system in England was carried to perfection by the Normans.

After the Civil Wars, the Parliament, deeming them the strong holds of feudality, passed an act to dismantle them and sell their furniture and moveables. In consequence, many hundreds were demolished, and their ruins, and those of the religious houses, dilapitated by Henry VIII., constitute the antiquarian curiosities of the kingdom. They were chiefly built between the Conquest and Edward III. In Stephen's reign, no less than 1,115 had been built.

Archers were a formidable part of all ancient armies, and the use of the bow seems to have been known to all nations when first discovered. The Scythians were the best ancient archers, and the English among the moderns. The victories of Cressy, Poictiers, and Agincourt were chiefly gained by the English archers. The Scythian bow was horn. The English long-bow was five feet six, and they were made of steel and brass. Arrows were from three to five feet. Ash was used by the English, and goose feathered, two white and one black. The heads were iron or brass, with light steel points, and small barbs. The strings were of gut, or hide, or hemp. A sheaf of arrows was 24; and the archer was armed with a maul and a dagger. The English archers drew to the ear, steadily. A furlong was the distance of the butt in shooting at marks. The Parthians, and other nations, had horse archers, and these were the centaurs of the Greek heroic ages.

The usual range of the long-bow was from 3000 to 4000 yards. Robin Hood and Little John shot that distance. They could shoot six arrows in two minutes. Cross-bows were fixed to a stock of iron or wood. It was bent by a lever, and its two strings were discharged by a trigger. It discharged bullets and stones, as well as arrows. Its range was 150 yards.

The mark used by archers, in trials of skill, was called a popinjay, because like a parrot. Cross-bow-men, fired quarrels, or darts and stones. Bowers made bows, and fletchers arrows and darts.

BUILDINGS.

The first habitations of mankind were cabins, grottoes, or caves. Virgil says, that, before Troy and Pergamean citadels existed, men dwelt in the bottoms of vallies. Some of these early cavern-dwellings exist at Ispica, in Sicily, and, being the works of men little removed from a state of nature, are of the most remote antiquity. Gellio, son of Cœlus, first invented mud-buildings, from a martin's nest; and Plutarch mentions cottages, as made of frame-work and mud. Before the invention of brick-houses, by Euryalus and Hyperbius, caves were used. The flat roofs of the private buildings distinguished them from the public edifices.

Diodorus Siculus speaks of the houses of the Britons as built of wood, the walls made of stakes and wattling, like hurdles, and thatched with either reeds or straw. (Wattled chimneys still occur in Wales.) Afterwards the dwellings were improved. Some set up strong stakes in the banks of earth, as well as large stones, rudely laid on each other without mortar. Strabo says, that the fashion was round, with a high-pointed covering at top; and Cæsar, that they resembled the Gaulish houses, and were only lighted by the door. That this was perfectly correct, appears from the representations of them on the Antonine column, where they are either cylinders, with an arched lofty entrance, single or double, or exact fac-similes of great tea-canisters in grocers' shops; the orifice, where the lid shuts, being (according to Henry) for emission of smoke. Strutt says, that they were built at some distance from each other, not in streets, generally on the banks of a river for water, or in woods, &c. where forage might be found for the cattle. The prince chose the most convenient, and his followers erected theirs around, as well as stalls for the cattle; a ditch and mound of earth, or rampart, surrounded the whole.

Sammes, speaking of the first church of Glastonbury, says thus; "the walls of the church were made of twigs, winded and twisted together, after the ancient custome, in which kings' palaces were used to be built. So the King of *Wales*, by name Heolus Wha, in the year 940, built a house of white twigs, to retire into when he came a hunting into South Wales; therefore it was called Ty Guyn, that is, the *White House*, for he caused the twigs to be barkt. Castles themselves, in those daies, were framed of the same materials, and weaved together; for thus writes *Giraldus Cambrensis*, of *Pembroke Castle: Arnulplus de Montgomery* (saith he,) *in the daies of King* Henry *the first, built that small castle of twigs and slight turf.*" Such *reed houses* as these we see in *Ireland*, and in many places in England.

Caves in rocks, like those at Nottingham, and in India; or holes in the ground, like those on the North-west coast of America; the tents of the Arabs, the kraals of Hottentots, and the wigwams of North American Indians were the first habitations of all nations.

The *Cyclopean Style*, from its extraordinary magnitude, is ascribed to the early Cyclops, men, who, from their power, prowess, and mighty works, are believed to gave been the Giants and Titans of the Septuagint version of Isaiah; whose monarchs became afterwards the demi-gods of Greece and Rome. The general character of the Cyclopean style was immense blocks without cement; the walls are now irregular, from smaller stones, which filled up the interstices, having disappeared. Hamilton divides the style into four eras: the *first*, or oldest, is that used at Tiryns and Mycenæ, consisting of blocks of various sizes, of which the interstices are, or were, filled up with small stones.

The *second* era, as at Iulis and Delphi, of polygonal stones, which fit into each other with great nicety.

The *third* style, as in the Phocian cities, and in some of Bœotia and Argolis, distinguished by the work being made in courses, and the stones, though of unequal size, of the same height.

The *fourth* presents horizontal courses of masonry, not always of the same height, but formed of rectangular stones.

Pliny says, that the Cyclops were the *inventors* of the fortifications of towns, and also of towers. Tiryns is the best specimen of the military architecture of the heroic ages, and Homer calls it the well-walled Tirynthus, so that the present ruins are those of the citadel, which existed in the time of the poet, built about 1379 B. C., by Perseus.—*Fosbrooke.*

Euripides calls Mycenæ a Cyclopean city; and Homer mentions it among those which were fortified before the Trojan war. Apollodorus says, that Perseus fortified Tiryns and Mycenæ. The Gate of the Lions, says Pausanias, is said to be the work of the Cyclops, and the lions are the only existing specimens of the sculpture of the heroic ages. They have no tails, a circumstance observable also in the sculptures of Persepolis, where animals very like those of Mycenæ are

represented, as well as lions, who have the tail.

At the Cyclopean gate of Mycenæ, the markets were held, "And here," says Dr. Clarke, "we see the origin of the vicinity between the forum, senntehonse, and basilica." That the Cyclops were Celts is certain; and it appears that the postern gate of Mycenæ is in the form of one of the Trilithons of Stonehenge; and that the Cyclops worshipped the Sun, whose temple in Britain, mentioned by Diodorus, is that celebrated remain, and altogether Cyclopedian. If their name was characteristic, they were circle-builders for the Druids. The workmen who built Stonehenge, Abury, Stanton-Drew, &c. were likely to travel when they had exhausted patronage at home as Cyclops, or circle-builders.

The Cyclopean masonry was not limited to Greece. Two fine specimens occur in Italy, at Ansidonia and Saturnia, towns anterior to Rome, and at the Old Lycosures in Arcadia, whence issued all the colonies of Italy.

We see the religious style of architecture, belonging to the Cyclopean age, in the remains at Salsette, Elephanta, Canora, and Elloura. They are caverns cut out of a rocky hill, and shaped into courts, supported by parts of the rock, formed into columns, with cushion-like capitals. The sides are filled with bas-reliefs, so prominent that they are joined to the rock only by the back. Many of the figures are colossal.

Egyptian architecture astonishes by massy grandeur. It simply consists of enormous blocks, thick columns, walls narrowing upwards, with immense impending cornices, but no pediments, because, as it never rains in Egypt, there was no necessity for these, or roofs. It improved the Cyclopedean.

The earliest Egyptian column was simply a stalk of the lotus, topped by its calix. The lotus is the ornament, which reigned every where; and it is interlaced with infinite grace in the volutes of Ionic and Composite capitals. The calix of a flower above a bundle of its stalks suggested the form of the column, base, and capital. All the ornaments are heavy in execution, and offer no repose to the eye. Every thing was upon a grand scale, suited only to kings and conquerors, and their buildings are characterised by forests of columns, avenues of sphinxes, lions, or rams, all colossal. Large moles, with immense colossal statues in front of them, obelisks, gate-ways preceded by avenues, and detached from the moles which flanked them.

Strabo thus describes an Egyptian temple: At the first entrance is a court or avenue, paved with stones about 100 feet wide, and 3 or 400 feet long, sometimes more. This is called the Dromos. On each side are sphinxes in two rows, about 30 feet asunder. After this, is one or more vestibules. Next is the temple, which consists of a large court or anti-temple, and an innermost temple. The latter is not very large, and there is no sculpture in it; or, at least, if there is, it is of some beast, but never of the human figure. At the further end of the anti-temple are a sort of wings, of the height of the temple, and the walls as far distant from each other as are the breadths of the foundations of the walls of the temple, and they are so built as to incline towards each other. On these walls are cut very large figures, much like the Etruscan and Grecian works. Strabo joins with Herodotus in saying, that the Egyptians and Phœnicians were the first nations who erected temples, but the Indian caverns are justly presumed to be more ancient.

Denon gives the general plan of the great temples: 1. An avenue of sphinxes. 2. Two colossal figures on each side of a gateway, formed by immense towers of truncated pyramids, with overhanging cornices. 3. This gateway led into a court full of columns, and chambers round the walls. 4. Passing across this, the visitor comes to other courts, likewise full of columns, through gateways, ornamented with colossal figures and obelisks. 5. In the centre was the sanctuary, without light, consisting of a single excavated block. One of them, at the temple of Latona, was 71 feet broad in front, carved out of one entire stone, and roofed by another.

Sesostris is said to have brought from the mountains of Arabia, a rock 20 cubits broad, and 150 long. Herodotus mentions one more than 20 cubits broad and 15 long, conveyed from Elephanta by a journey of 20 days. The general rule for determining the age of Egyptian temples is their size. The smaller they are, the more ancient.

The Egyptians believed that their souls, after many thousand years, would re-inhabit their bodies, if these were preserved. Hence the embalming, and the situation of the sepulchres, in places not subject to the inundation of the river. These tombs at Thebes consist of sepulchral grottoes, made in the side of a hill, from its base to within three quarters of its summit. The lowest are the best executed, and the most spacious. A door open to the east leads to a gallery supported by columns or pilasters. At the end of the gallery is a well, which leads to the catacombs, where the mummies were deposited. These wells, from 40 to 60

feet deep, abut upon long subterranean alleys, terminating in a square room, supported by pillars. In the upper gallery are bas-reliefs, or paintings on subjects relating to the funeral ceremonies; and every grotto had a ceiling painted in a fanciful manner. Every grotto communicated with the valley by a large door. This leads into a succession of galleries, with chambers on both sides. The chief object of notice, however, in these souterrains, is the fresco paintings. They exhibit all the arts of civilization which then existed in Egypt, as manufactures and agriculture, carriages, pottery, counters for trade, rural employments, hunting, fishing, marches of troops, punishments, musical instruments, habits, and furniture.

Sesostris placed, in the temple at Memphis, colossal figures of himself and his wife, 50 feet high, and of his children, 28 feet.

There can be little doubt but Sesostris was the great builder. It was his passion in all his conquests.

The Pyramids of Egypt have been opened within these few years, but without particular discovery. Besides some passages, and an empty chamber in the great Pyramid, 66 feet by 27, in an upper chamber, 36 feet by 18 and 19 high, there was found a sarcophagus. Similar chambers were found in smaller pyramids empty, but sometimes containing images and rude sculptures. Belzoni penetrated the second pyramid of Chesroes, and found a chamber, 46 feet by 16, and 24 high, with a sarcophagus, and an inscription certifying that it had been opened by Mahomet I. The great pyramid is 543 feet high, and the second, 452 feet.

The Temple of Ypsambul, in Nubia, is cut out of a solid rock, and of vast dimensions. Belzoni found in it 4 colossal figures 65 feet high, 25 feet across the shoulders, the face 7 feet, and the ear above a yard.

The same English and Italian excavators also dug out the great Sphinx, and found that it was sculptured from the solid rock, the paws only being put on by masonry.

The Sepoys, who accompanied Baird's expedition to Egypt, paid reverence to the colossal figures on the temples, as connected with their ideas about Vishnu.—*Clarke.*

Babel, or Baalbel, was a lofty temple built at Babylon, by Belus, both as an observatory, and a temple of the Sun. It remains still in existence, under the name of Birs Nimroud. It was formed of 8 square towers, one on the other, 660 feet high, and the same at each side of its base. Lately its height was 160 feet, and the reeds, between every 3 or 4 layers of brick, were perfectly fresh, while the brick seemed to be calcined by fire. Babylon continued, for 2000 years after, to be the most splendid city in the world, and so Alexander found it as late as 325 B. C. According to the Jewish annals, it was built 2234 B. C. beautified and enlarged in 2150, by Semiramis, who led from it her armies of all nations. The Euphrates passed through it. It was a square, 15 miles on each side, with 100 brass gates. It was composed of 25 streets each way, 15 miles long, and 150 ft. broad, crossing each other at right angles, besides 4 half streets, 200 feet wide, facing the walls, in detached houses, with gardens and pleasure-grounds. The walls were 87 feet thick, and 370 high. So says Herodotus and other ancients, but the whole must be exaggerated, for, 15 miles each way, would be 225 square miles; and London, vast as it is, does not cover above 32. It must have been equal to Middlesex, and its walls as high as St. Paul's.

The palace, the hunting gardens, the artificial lake 40 miles square, and 6 fathoms deep, as well as the temple of Belus, or Baal, with a golden image, 40 feet high, valued at 3½ millions sterling, all savour of eastern exaggeration. In 540 B. C. it was besieged by Cyrus, but being provisioned for 20 years, he blockaded it for 2 years, and then took it by fording the river during a festival of the Babylonians. In 518, under Darius, it revolted, and being retaken, its 100 gates and walls were destroyed. In 478 Xerxes, after his defeat in Greece, passed through Babylon, and, to recruit his treasures, plundered the temple of Belus, and demolished its lofty tower. In 324, Alexander began to re-build it, and employed 10,000 men for 2 months, but his death arrested their progress. Thirty years after, Seleucus built Seleucia near it, and drew off its inhabitants, so that in 650 years after, Jerome describes it as deserted.

The palace of the kings of Babylon is still so called by the natives, under the name of the *Ksar*. It is a vast mass, 700 yards each way. The walls are 8 feet thick, one within another, and strengthened with buttresses.

There is also another extensive ruin, called *Amran*, three quarters of a mile long, and half a mile broad, which rises 50 or 60 feet above the level of the plain.

A third mass is called the *Muljelibé*, which is considered to be the remains of the tower of Belus; the sides are from 200 to 150 yards, and the present elevation is 141 feet. The ruins are immense, consisting of pottery, vitrified brick, bitumen, &c.

The other vast ruin or tower, six miles south-west of Hellah, is called the *Birs Nimroud*, and consists of a mound, 762 yards round, rising in a conical form, 198 feet, and on its top is a solid cone of brick-work, 37 feet high.

Whether this last or the former is the temple of Belus, seems uncertain; near it is another mound, with traces of ruins of vast magnitude.

The three former buildings are on the eastern bank, and the *Birs Nimroud* on the western side of the Euphrates.

The whole lie north of Hellah, 9 miles from Mohawil, and 48 from Bagdad; and, for their age, are wonderfully preserved.

The walls of Babylon were 46 miles round, so that when the city decayed, it served as a park for hunting to the kings of Persia.

The wall which separates China from Tartary has been built full two thousand years, and is supposed to be upwards of 1200 miles in length. Its height varies according to the circumstances of the surface. Where one of us contrived to get to the top, it was upwards of 30 feet high, and about 24 broad. The foundation is laid upon large square stones; the superstructure is brick; the centre is a kind of mortar, covered with flag-stones. A parapet of no ordinary strength runs on each side of an embattled wall. If we consider that this immense fabric crosses the widest rivers, on arches of proportionate size, or, in the same form, connects mountains together, occasionally ascending the highest hills, or descending into the deepest vales, the most active powers of imagination will be required to realize this effort of man! In every situation, however, the passage along it is easy and uninterrupted; and it serves as a military way from one end of the kingdom to the other. At proper intervals there are strong towers placed, from whence signals are repeated, and an alarm may be communicated to the most distant parts of the Empire, with the expedition of the telegraph.—*Macartney.*

The Porcelain Pagoda, or Temple of Gratitude, at Nan-king, was begun in 1403, and finished in 1432. It cost 2,485,484 ounces of silver. The globe at the top cost 48 kin (64 lbs.) of gold and 1400 kin (1866 lbs.) of copper, and is 36 che (42 feet) round. There are 81 iron bells of 16 lbs. It has 8 sides, and is 240 che (280 feet) round. The 9 stories are 228 che (266 feet) high, and the pinnacle is 127 che (148 feet) above the highest story. There are 49 lamps, burning each, per night, a kin (16 oz.) of oil, whose splendour reaches the 33d heaven. The priests are 850, and the enclosure is 771 meu, (about 760 acres.) It has been twice struck by lighting, which the priests call "the god of thunder pursuing a monstrous dragon into the temple."

The East abounds in vast structures devoted to religion and to mausoleums. To describe them would fill volumes, and they very strikingly illustrate oriental despotism, pride, and abject slavery.

Among the splendid tombs in Agra, is that of the wife of Sha-gehan, which employed 20,000 artists and workmen for 22 years. It is of black and white marble, and has three platforms, with four towers, and a magnificent dome.

The Caaba, now the Temple of Mecca, was the ancient Temple of the Arabs, with 360 idols, one for every degree, and the statue of Hobab, with seven arrows for the planets. This worship was established by Saba, said to be the eighth from Noah, who called himself Servant of the Sun, and was the founder of *Sabeanism*, which once extended over Asia. They built temples to the seven planets, the 12 signs, and 24 principal constellations. They reverenced the Book of Seth, who divided the zodiac, taught the aspects, assigned the virtues of the planets, &c. Job was of this country, and the chief race of their kings was called Tobha. Hence, the references to the Pleiades, &c. The Caaba is now called *El Harram*, or Inviolable, and in the north-east corner is the tomb of Mahomet, surrounded by an iron-green railing, interwoven with inscriptions, in philagre of yellow bronze, of "*La Illaha il Allah al hak al Mobyn*," meaning "There is no God but God," in silver letters. The railing and its ornaments are so close, that there are small windows to look through. Persons of rank are permitted to go within the railing, where nothing is seen but a curtain, which covers a square building of black stones; in the interior of which are the tombs of Mahomet, Abu Beker, and Omar. The coffins are below; and that of Mahomet is cased in silver, with an inscription, "In the name of God bestow mercy upon him." The stones, or tomb in the centre, have rich coverings. The curtain round them is 30 feet high, and these articles, when changed, are sent as a present to every new Grand Seignior, to cover the tomb of his predecessor, and he returns new ones in exchange.

The Caaba itself is a stone edifice in the temple, of extreme antiquity, and held in such sanctity, that the Mahometans, in their prayers, always direct their faces towards it. The floor is raised six feet, and a door and window

admit light. They say it was built by Adam, and rebuilt by Abraham and Ishmael; and they show the place where he stood, now enclosed with iron; also the tomb of Ishmael, and a black stone, given by Gabriel to Mahomet. Every true Mussulman must once visit the Caaba, and, in consequence, thousands of pilgrims visit it annually. The ceremonies are, walking seven times round the Caaba, kissing the black stone, &c. &c.; ceremonies used for ages before Mahomet, by the Sabeans, but re-enjoined by him.

The Greeks and Romans working in marble instead of sandstone, limestone, and granite, introduced more taste and precision into their structures than the Cyclopedianswho preceded them. They invented or copied, from the Etruscans and Cretans, five orders of architecture, the Tuscan, Doric, Ionic, Corinthian, and Composite; to which we now add, the Gothic, Oriental, Egyptian, and Chinese styles.

In the Tuscan order, the shaft is six times the diameter, and the base and capital, each, half a diameter; the whole seven diameters, and the pedestal is a fourth more, and the entablature a fifth.

The Corinthian column is 20 modules high, the entablature 5, the base 1; the capital, 70 minutes.

In the Composite order, the height is 20 modules, the entablature 5, the capital 70 minutes, the base 30 minutes.

In the Doric order, the base is 32 minutes, the pedestal 1 diameter 36 minutes, the cornice 16 minutes, the base 3 minutes, the shafts 7 diameters, the capital 30 minutes, the architrave 30, the frieze 45, and the cornice 45. The height of the base, shaft, and capital is 10 modules; the entablature over the capital is 4 modules, 1 for the architrave, $1\frac{1}{2}$ for the frieze, and $1\frac{1}{2}$ for the cornice. The base is one module, and the capital 32 minutes.

The spiral ornaments, like Ram's horns, in the Ionic, Corinthian, and Composite, are called *Volutes.*

Caryatydes, to support entablatures, were figures of Carian women, taken prisoners in the city of Caria, by the Athenians. Men are called Atlantides.

Ascending, the parts of a column are — the plinth, the torus, the bead, the cincture, the shaft, the astragal, the colormd, the annulets, the avolo, the abacus, the fillet, the architrave, the frieze, the cornice, the listel, or uppermost projection.

Columns consist of pedestal, shaft, and capital. A pillar is a detached column. A pilaster is a support in a wall, square, but in the proportion of the columns.

A minute is the 60th of the greatest diameter or module.

Columns, in ascending, are diminished one-sixth or 2-13ths in diameter, commencing about one-third of the height.

Egyptian modules are the height of the Ionic column, and $4\frac{1}{2}$ is the entablature. The capital is 21 minutes, and the base 30 minutes. In the entablature, the architrave is 3, the frieze 3, the cornice 4.

The Saxon style is known by the circular arch, and the Gothic by the pointed arch, either single or florid.

In domestic architecture, a well-proportioned room is a breadth and a half long.

Nineveh was 15 miles by 9, and 40 round, with walls 100 feet high, and thick enough for three chariots abreast.

Babylon was 60 miles within the walls, which were 75 feet thick, and 300 high, with 100 brazen gates.

The largest of the Pyramids is 543 feet high, and 693 feet on the sides; its base covers 11 acres. The stones are above 30 feet in length, and the layers are 208; 360,000 men were employed in its erection.

The Labyrinth of Egypt contained 3000 chambers, and 12 halls.

Thebes, in Egypt, presents ruins 27 miles round. It had 100 gates.

Carthage was 25 miles round.

Athens was 25 miles round, and contained 25,000 citizens, and 400,000 slaves.

The Temple of Delphns was so rich in donations, that it was once plundered of 10,000 talents, or $2\frac{1}{4}$ millions sterling; and Nero carried from it 500 statues.

The walls of Rome were 13 miles round.

The length of Solomon's Temple, built between the years 1014 and 1005, was 60 cubits, or 107 feet, the breadth 20 or 36 feet, and the height 30 or 54 feet. The porch was 20 cubits, or 36 feet long, and the breadth 10 cubits or 18 feet. Though extolled as one of the wonders of the ancient world, it did not surpass our larger sort of private houses.—*Smith's Michealis.*

The Temple of Diana, at Ephesus, was 425 feet long, and 200 broad, with 127 columns, 60 feet high, to support the roof. It was 220 years building. In it stood a mean statue, in wood, representing a female with many paps. It was rebuilt seven times. In 356, on the day Alexander was born, it was burnt by an incendiary. To rebuild it, employed 220 years. It was 425 feet long, and 225 broad, supported by 127 columns, 60 feet high, furnished by princes, and curiously sculptured, each weighing 150 tons of Parian marble.

Internally, it was decorated with gold, paintings, and statues by the great masters—Scopas, Apelles, Praxiteles, Parrhasius, and the female Timarete. The priests were emasculated, and the sacred virgins were of the highest birth. It was finally destroyed by the Goths, in 260. The Turks, in 1300, finished the overthrow of all its edifices, and Ephesus itself is now deserted for Ajasoleck, two miles distant.

The Temple of Baalbeck, in Syria, was famous for its devotion to Baal, or the Sun, but now in ruins. The outer court, covered with architectural ruins, is 180 feet in diameter. There is then a square of 350 feet, and, on its west side, six enormous columns, the peristyle of the grand temple, once 54 in number, 21 feet round, and 72 high. There is also a smaller temple, with 21 columns, 15 feet round, and 44 high. The stones of the walls are 30 feet long and 9 deep, and three are 58 feet long, and 12 deep.

The construction of temples was adapted by the ancients to the nature and functions of the deities. Those of Jupiter Fulminous, Cœlum, the Sun, Moon, and Deus-Fideus, were uncovered. The temples of Minerva, Mars, and Hercules, were of the Doric order, which suited the robust virtue of these divinities. The Corinthian was employed for Venus, Flora, Proserpine, and the aquatic Nymphs. The Ionic was used in the temples of Juno, Diana, and Bacchus, as a just mixture of elegance and majesty.

Rome has catacombs of vast extent; and Paris and Syracuse have others, but no mummies.

Twelve great roads diverged from ancient Rome, and spread all over the empire, there being 12 branches near the city, and 18 others in Italy.

Among the Romans and the eastern nations, bathing was a constant and costly luxury, and warm-bathing generally prevailed; while, to indulge in it, every refinement of architecture and ornament was exerted. The public baths had five or six apartments for dressing and undressing, and they were called Thermæ. In Rome, there were 856 public baths; single ones of which could accommodate 1800 persons at once, and some of them still remain as objects of ancient splendour.

The Mahomedans consider frequent bathing as a religious duty, so that every house has its bathing apartments, and every village its public bath. Warm and hot bathing are also very general in Russia and Hungary.

Aqueducts were the principal structures of the Romans. The ancients were ignorant that water, in pipes, finds its own level; and hence Sesostris, Semiramis, and the Roman emperors, constructed vast aqueducts, whence pipes issued for local service. Some were 60 miles long, passing over valleys 190 feet high, with a fall of one foot in 200. Two still remain at Rome, and that of Segovia lately contained 159 arcades.

Amphitheatres were vast erections in the Roman empire to amuse, or rather brutalize, the people, and qualify them for military life, by the exhibition of murderous contests between gladiators and wild beasts. They were of an elliptical form, and adapted for thousands of spectators, to whom carnage was made a pastime. They were invented by Julius Cæsar and Curio. Augustus caused them to be erected every where. In the reign of Tiberius one fell at Fidenæ, by which 50,000 persons were killed or wounded. Vespasian built the first of stone, the vast Coliseum for 100,000 spectators. Its longest diameter is 615.5 feet, and the other 510, covering 5½ acres, and being 120 feet high. It was imitated at Capua, Verona, Nismes, Autun, and Pola; while at Italica, Alba, Otriculi, Puzzuoli, Pœstum, Syracuse, Corinth, Arles, Caerleon, and other places, smaller ones were constructed.

On the triumph of Trajan over the Dacians, 11,000 animals were killed in those at Rome; and 1000 gladiators fought during 123 days. The gladiators at first were malefactors, who fought for victory and life; or captives and slaves, who were made to fight for freedom; but soon many lived by it as a profession, and even ladies became gladiators. They continued with modifications for above 500 years. Tilts and tournaments, with duelling, were the last remains of them.

The roofs of houses, among the ancients and eastern nations, are flat; and they often sleep upon them, and have gardens upon them. The Greeks gave the roof a small elevation in the middle; the Romans increased it to a fifth of the span. The Germans, and other northerns, make the roof an equilateral triangle.

All the chambers in the houses at Pompeii, and the best, those entirely painted, received light only by the doors. Neither the rooms nor houses have any kind of symmetry; even a Mosaic pavement has been seen to descend towards the door. The only house with two stories ever discovered, is at Pompeii. The stories consist of arches over each other.

Forums were places originally destined to negociation, either of merchants or others, whose dealings took place in the open air. They were ge-

nerally surrounded by a colonnade, over which was sometimes a second, for the convenience of those who wished to view the shows, for the forum was also the scene of the gladiatorial combats, before the invention of amphitheatres. Basilicæ were subseqently added, for the protection of litigants, and decision of causes under shelter. No city, however small, was without its forum. It was a market-place for all kinds of goods, whether of rustics or citizens. Under its porticoes were exercised all sorts of trades, liberal, servile, or sordid; and within them were arranged the bankers' shops and coffee-houses. In the forum was also the senate-house, the curia for the assemblies of Augustals (similar to our common-council) and priests for cognizance of sacred matters, the Comitia for assemblies of the people, the Ærarium, or Treasury, Record-office, and public granaries.—*Fosbrooke.*

Winckelman, quoting the comedies of Plautus and Terence, observes, that Grecian doors opened outwards; so that a person leaving the house, knocked first within, lest he should open the door in the face of a passenger. Hinges were not then in use; and at Rome, Pompeii, and Herculaneum, doors, even of marble, have at top and bottom pivots, which turn in sockets.

Rome was supplied with water by 13,594 pipes from the aqueducts.

Towns originally were fortresses, to which rustics retired with their cattle, when there was danger from the incursion of enemies.

The Seraglio, at Constantinople, is on the eastern point. The area is 150 acres, inclosed with high walls. The entrance from the west is called the Sublime Porte, a name frequently given to the whole government. The second gate is called the Gate of Happiness, and in its splendid buildings are lodged from 5 to 600 females, guarded by eunuchs. There is also an old seraglio in the centre of the city, where are kept the wives and concubines of former sultans. At a short distance from the Sublime Porte stands the ancient Christian Church of St. Sophia, built by Justinian; and since the Mahometan conquest, in 1453, used as an imperial mosque. It abounds in curiosities. Its length is 269 feet, and its breadth 243 feet. Six of its pillars are of green jasper, from the Temple of Diana, at Ephesus; and eight of porphyry, from the Temple of the Sun, at Rome.

The country residence of the Russian sovereigns is 22 wersts, on the road to Novogorod, and is called the Czarskoselo. It is a large and very splendid palace, where the imperial family have resided for the last 70 years.

The Vatican, a magnificent palace, in Rome, is said to consist of 7,000 rooms. It is advantageously situated on an eminence, one of the seven hills that ancient Rome was built on. The parts of the most admired are, the grand staircase, the pope's apartments; and, above all, the vatican library, so beautiful a fabric, that it is said it will admit of no improvement, and also the richest in the world, both in printed books and manuscripts.

The New Palace, in St. James's Park, was estimated at 432,926*l.* £450,000 was granted, in 1824-5, for repairing and improving Windsor Castle, one of the noblest royal palaces in Europe.

But the most superb palace in Europe is that of VERSAILLES, about 12 miles from Paris, built by Louis XIV.; and next to it are the series of Parisian Palaces, the Louvre and the Thuilleries, all of vast extent and splendour.

The Bastile, at Paris, was a state-prison, subject to no legal controul, in which persons who offended the government or minister, or the king's mistress, were shut up during pleasure, without the knowledge of their family, or of their offence. This justly-odious prison was levelled to the ground by the Parisian populace, on the 14th July, 1789.

Pompey's pillar is 92 feet high and 27½ round at the base. The Arabs call it the Pillar of the Colonnades, for it was once surrounded. It is referred to the age of Dioclctian.

The ancients painted statues and sculptures with showy colours.

Kitts-coty-house, as it is called, in Kent, was of druidical origin, and consists of three upright stones, eight or nine feet high, surmounted by a very large slab. Similar structures are common all over Europe, and bear the name of cromlechs. There are several in Cornwall and Devonshire, of a still larger size; but generally consisting of three uprights, and a roof of stone, weighing from 30 to 90 tons. There are several in Ireland, and many in Wales, some of which have five or seven supporters of enormous dimensions, and frequently at the tops of high hills, and in districts which demand that the stone should have been carried from a great distance.

Barrow is the name of those circular mounds found in Britain and other countries, to record a burial on the spot. Their size is supposed to be proportioned to the rank and means of the party. The Kings of Egypt built pyramids. The largest in England is that of Silbury-hill, near Marlborough. In

Scotland, they are called Cairns; and, in England, they have sunk to the modest grave. The Greeks made large barrows; but the largest, next to the pyramids, are those of the Kings of Lydia. One of these is three-quarters of a mile round. Even the savages in America erect similar monuments, and some of great size. In Scotland and Wales they are often made of stones; and the Jews had a custom of the kind. Those which have been opened in England contained skeletons, urns, and warlike implements. It has been supposed, that they were so placed as to serve as signal stations; but, perhaps, some of these may have been beacons, and not barrows.

Sir Richard Hoare caused several barrows, near Stonehenge, to be opened in 1808. In them were found a number of curious remains of Cambrian ornaments, such as heads, buckles, and brooches, in amber, wood, and gold.

Caer-leon or Caer-Llion, near Newport in Monmouthshire, was, beyond question, a British city of considerable size and splendour. It is now reduced to a few houses; but the vicinity is covered with foundations, and the plough turns up numerous antiquities of remote ages.

Stonehenge, in Wiltshire, is the chief existing monument of remaining British buildings. There can be little doubt but that this circle is the Temple of the Sun mentioned by Diodorus. It is circular, as were all Temples of the Sun and Vesta. The adytum, or sanctum sanctorum, is oval, representing the mundane egg, after the manner that all those adyta, in which the sacred fire perpetually blazed, were constantly fabricated. The situation is fixed astronomically; the grand entrance, and that of *Abury*, being placed exactly north-east, as all the gates or portals of the ancient cavern temples were, especially those dedicated to the Sun. The number of stones and uprights in the outward circles, making together exactly sixty, plainly alludes to that peculiar and prominent feature of Asiatic arithmetic, the sexagenary, while the number of stones forming the minor cycle of the cove, being exactly 19, displays the Metonic, or Indian cycle; that of 30 repeatedly occurring, the number of degrees in the signs of the Zodiac. Further, the temple being uncovered, proves it to have been erected before the age of Zoroaster, who first covered in the Persian temples. Finally, the heads and horns of oxen and other animals, found buried in the spot, prove that the rites, peculiar to solar worship, were actually practised. The present Stonehenge was,' no doubt, revived by Ambrosius about 460. A green walk surrounds it, made on purpose for the *Deasnil*, or going three times round it, a druidical custom, afterwards practised in Ireland, and there is a similar walk at Abury.

Adrian's wall, from the Forth to the Clyde, was built in 120, of turf. Antoninus, another, in 140; and Severus, one of stone, in 208. It had a ditch to the north 40 feet wide, and 20 deep, and the wall was 20 feet high and 24 thick. It extended 36½ miles, and joined 21 Rmoan forts.

The Picts' wall extends from Newcastle to Bowness, on the Solway Firth. It was originally of turf; but, in 416, was rebuilt of stone.

In the beginning of the 13th century, the Gothic style seems to have been completely established. In this early style, the arches differed very much, but were usually sharply pointed; the windows long, narrow, and lancet-shaped, and frequently decorated in the inside, and sometimes on the outside also, with slender shafts, frequently with fasciæ round them, and the capitals with foliage.—*Lysons.*

The naves of churches were not always paved, whence the use of rushes, for warmth and better kneeling. Men used to stand on the right hand, or south side; women on the left, or north.

The Steeples of Cologne and Strasburg are about 500 feet; those of Ulm and Antwerp 480 feet.

Salisbury Spire, the highest in England, is 410 feet; the Cross of St. Paul's is 404 feet; the great Pyramid of Gheza is 543 feet.

Canterbury Cathedral is 514 feet long, 80 feet high, and 154 feet broad; the choir is 180 feet by 40; the great tower is 235 feet high.

It nearly adjoins the ruins of St. Austine's Abbey, part of which is now a brewhouse; and, at the distance of half a mile, is St. Martin's church, the first erection for Christian service in Britain.

Three Hundred New Churches and Chapels have been built, or are building, under the late act, sufficient to accommodate half a million of persons, taking 1,600 to each.

Walbrook Church is famons all over Europe, and is justly reputed the masterpiece of Sir Christopher Wren.—Civil architecture and engineering in England and Europe, take precedency of royal works, to gratify the pride and vanity of despots.

St. Peter's at Rome is 233 feet wide, and 448 high. Milan cathedral is 216 wide, and 350 feet high. St. Maria,

Florence, is 517 feet long and 386 feet high.

The Mexican temple of Cholula, about 60 miles east of Mexico, is 164 feet high, and 1,450 feet each way; and on this are 3 other similar stories of eqnal height. It stands on an artificial mountain with its sides to the Cardinal points, and in its brick and clay resembles the Pyramids of Egypt.

The great causeway of the Incas from Quito, through Cusco to La Plata, in south lat. 19°.40, nearly 2,000 miles long, still remains in parts, with ruins of great buildings near it, and altogether is one of the greatest of all monuments of human industry.

Trajan's Column at Rome is 132 feet. The Phocas Column is 54 feet. The Antonine Column is 110 feet. The London Monument is 202 feet. The Washington Column, Baltimore, is 161.

Napoleon's roads over the Alps are that over Cenis, 30 miles long and 18 yds. broad; that over Semplon, 36 miles long and 25 yds. broad; partly through galleries hewn through the rocks, one 683 feet; that over Genevre, 6,000 feet high; that from Nice to Monaco; and that over St. Gothard, 8,264 feet high. Altogether, they are the most gigantic efforts of human labour since the Pyramids of Egypt, yet how much more useful.

The Menai bridge, opened Jan. 30, 1826, is 1,600 feet, 30 feet wide, and 100 feet above the water. The weight suspended is 343 tons, and the power 2,016 tons. The water-way is 500 feet.

The following is a correct list of the Main Canals in the United Kingdom, and many of them have branches which are about 200 miles.

Name.	*When made.*	*Length in miles.*	*As. & Des. in feet and dec. parts.*	
Aberdare	1793	7¼	40	5.5
Aberdeenshire	1805	19	170	8.8
Andover	1790	22½	177	7.8
Ashby de la Zonch	1800	40¼	224	5.6
Ashton-under-line	1797	18	152	8.4
Barnsley	1799	18	120	6.7
Basingstoke	1790	37	195	5.3
Birmingham	1772	22½	204	9.07
Bolton and Bury	1797	15	187	12.4
Brecknock	1776	33	68	2
Bridgewater	1758	40	83	2
Caistor	1793	9		
Caledonian	1822	21¾	1905	8.0
Chester	1775	17½	170	0.7
Chesterfield	1776	46	380	8.2
Coventry	1790	27	96	3.6
Crinan	1805	9	117	13
Cromford	1794	18	80	4.4
Croydon	1801	9½	150	15.8
Dearne and Dove	1804	9½	125	6.6
Derby	1794	9	78	8.6
Dublin and Shannon	1776	35½		
Dudley	1776	10½	35	3.3
Edinbro' and Glasgow		50		
Ellesmere	1804	109	755	6.9
Erewash	1777	11¾	181	15.4
Fazeley	1790	11		
Fazeley	1790	16½	248	15
Forth and Clyde	1790	35		
Foss Dyke		11	0	0
Glamorganshire	1775	25	600	24
Glasgow and Saltcoats	1812	13¼	168	5
Glenkenns	1802	27		
Gloucester	1793	18½		
Grand Junc. bra. 53 ms.	1805	93¼	587	6.3
Grand Surrey	1801	12		
Grand Western	1796	35		
Grand Trunk, bran. 37	1777	93	642	6 9
Grand Union	1800	23¼	130	5.5
Grantham	1799	33¾	148	4.4
Haslingden	1793	13		
Hereford & Gloucester	1790	36½	225	6.1
Huddersfield	1798	19½	770	39.5
Kennet and Avon	1801	57	263	4.6
Leominster	1797	45¾	544	11.8
Lancaster	1799	76	287	3.8
Leeds and Liverpool	1771	130	841	6.4
Leicester		21½	230	10.7
Leicestershire Union	1805	43¾	407	9.3
Loughborough	1770	9½	41	4.3
Lowestoff	1820	50		
Monmouthshire	1796	17¾	1057	53.5
Montgomeryshire	1797	27	225	8.3
Neath	1798	14		
North Wilts	1798	8½		
Nottingham	1802	15		
Oakham	1803	15	126	8.4
Oxford	1790	91½	269	2.9
Peak Forest	1800	21		
Portsmouth & Arundel	1815	14½		
Ramsden's Calder	1774	8	56	7
Regent's	1820	9	86	9.5
Rochdale	1804	31	613	19.7
Royal Irish		68	614	9
Sankey	1760	12½	78	6.2
Shorncliff	1809	18		
Shrewsbury	1797	17½	155	9
Shropshire	1792	7½	453	60.4
Somerset	1803	42		
Somerset	1802	8½	138	16.2
Southampton	1804	17½		
Stafford	1772	46½	394	8.4
Stainforth	1798	15		
Stourbridge	1776	5	191	38.2
Stover	1792	6½	50	8
Strondwater	1796	8	108	13.5
Swansea	1798	17½	366	20.9
Taunton		41		
Thames and Medway	1800	8½		
Thames and Severn	1789	30½	377	12.3
Uttoxeter		38	136	4.8
Warwick and Birm.	1799	25		
Warwick and Napton	1799	15		
Wey and Arun		16		
Wilts and Berks	1801	52	376	7.2
Worcester and Birm.	1797	29	128	4.3
Wyrley	1796	23	270	11.6

MYTHOLOGY AND THEOLOGY.

ORIENTAL MYTHOLOGY.

In the Hindoo Mythology the coequal and eternal powers are Brahma, the creative power; Vishnu, the preservative; and Siva, the converting power. In other words, Brahma is matter; Vishnu, spirit; and Siva, time; and, in other senses, earth, water, and fire.

The Hindoos are now worshippers of Vishnu and Siva; the vulgar by idols, and the learned by the spirit of God in Vishnu, or Siva, for God is deemed too awful for address.

Brahma has four faces, for the four elements and the four castes, the priest, soldier, trader, and labourer. The sun is his symbol.

The Vedahs teach that Universal Being is a conscious intelligent personality, which forms and sustains all visible and sensible things within itself, and by its own energies.

The Institutes of Menu assert that the supreme spirit alternately wakes and reposes for thousands of ages.

The Hindoos believe in the unity of God, and in subordinate deities, represented by the elements, stars, and planets. They teach a fifth element, which effects attractions, repulsions, &c. and call the sun adetyæ, the attractor.—*Sir W. Jones.*

The Hindoos assert that the deity Vishnu has visited the earth in nine several incarnations, and that a tenth is to come. This opinion has the sanction of indefinite antiquity. The first *awater*, or incarnation, was the Matsya avatár, the descent of the Deity in the form of a fish. 2d. Kachyapa, or Kúrma, in that of a tortoise. 3d. Varáha, as a boar. 4th. Nara-singha, as a monster, half man, half lion 5th. Vámana, as a dwarf. 6th. Para-ú-Ráma, as the son of Jamadagni. All these took place in the *Satya Yuga*, or golden age. The others are more recent. The *seventh* incarnation is called *Rama-chandra avatar*, the descent of Vishnu to destroy a giant. Their contests are the subject of the celebrated epic called the *Rámáyana*. The *eighth* avatár, called *Bala-Ráma*, was in order to chastise other giants; the *ninth*, Buddt'ha, had a similar object. The Kalki, or *tenth* avatár, is *yet to come*, at the end of the *Kali Yuga*, or the iron age.

Sir W. Jones, More, and Mrs. Graham tell us, that the Indian *incarnate God*, Chrishna, lived about 900 B. C., had a virgin mother of the royal race, and was sought to be destroyed in his infancy. It appears, that he passed his life in working miracles and preaching, and was so humble as to wash his friends' feet; at length dying, but rising from the dead, he ascended into heaven in the presence of a multitude.

The mortal parents of Chrishna were Vasedeva and Devaky. His father carried him over the Yamuna, to escape from the tyrant Kansa, who ordered all new-born infants to be slain.§ The ancient Hindoo picture, in Moor, of Devaky and Chrishna, is an exact counterpart of Raphael's Madona and Child, with glories round both their heads.

The Hindoo Budha, or Buddh, is a deity, supposed, by Jones, to be the same as the Scandinavian Woden, and the Chinese Fo. He fixes the incarnation of Budha in 1014 B. C., and that of Chrishna in 1300 B. C. The fourth day of the week is named after each.

Pilpay, the fabulist, was an Hindoo, of the name of Vishnu-Serman, and his fables were gleaned from the Sanscrit.

The Puranas are histories in blank verse, from the Creation to Buddha. The Vedas are philosophical discourses, or fundamental religious creeds.

Major Wilford, and other searchers into Brahmin mysteries, prove, very plausibly, that the gods of the Egyptians and Greeks were of Hindoo origin. The famous mysteries of Eleusis were concluded with the words *conx, om, pax;* and the Bramins, at this day, finish their service with the words *canscha, om, paxsha.*

The Shastah describes the disobedience of certain angels, who were turned into Murdh, or men, as a purgatory.

The burning of women began in India from one of the wives of Bramah, the son of God, sacrificing herself at his death, that she might attend him in heaven. Others do the same; and an instance occurred of 17 thus becoming voluntary victims at the death of their Rajah. It is a custom of all India, and called a *Suttee.*

The first sacrifices to the gods were fruits and flowers; but, as priests increased, animals were sacrificed to meet their own wants. The Hindoos are very bloody in their sacrifices of goats, &c.

Dow, in his History of Hindoostan, asserts that the word *Bramha*, in Sanscrit, signifies *wisdom;* and that the personage so called is a mere allegory. There are some other odd confusions of the same nature; thus the word *Pythagoras*, in the Welsh language, signifies a *system of the world.*

The Shaster is the bible of the Brahmins, or Hindoos.

The Gaurs, or Parsees, in India, worship fire, as an emblem of the Deity.

The Hindoos refer their gods to the White Island, in the west, which some very plausibly suppose to mean Britain;

and a likeness has been imagined between the country described in their history of Vishnu, and Wiltshire, in Stonehenge, Abury, &c.

Benares is one of the holy cities of the Hindoos, and a seat of one of their ancient observatories; the instruments in which are very large, and accurately constructed. Learned Brahmins reside here, who receive pupils from all parts of India. The city abounds in their temples.

The Bramins, or priests, claim to be produced from the head of Brahma; and, they say, that the Cshatriya, or Military caste, were produced from his heart; the Vaisya, or Mercantile Caste, from his belly; and the Sudra, or Labouring Caste, they ascribe to his feet. The Bramins monopolise the books and the learning, but both are filled with ancient superstitions. They are now mere logicians and metaphysicians, and their disputes are exactly akin to those of Europeans. The philosophy of Pythagoras, and the ancient religion of Egypt, appear both to be drawn from the Hindoos. Many of the Bramins have latterly become soldiers, and hold offices in the state.

Though the Hindoos maintain the division of the people into four ranks, or castes, yet the same division appears to have existed in other nations of Asia in ancient times, and also in Greece and Egypt; and Miller maintains, that the Saxons were classed as clergy, soldiery, husbandmen, and artificers. All these seem akin to that which we observe in bee-hives and ant-hills. The Hindoos call their castes—1. Scripture; 2. Protection; 3. Wealth; and 4. Labour; proceeding from the mouth, the arm, the thigh, and the foot of the Creator. The Brahmin, or priest, is the chief of all creatures; while kings, and exalted men, are infinitely inferior to the lowest of the Bramins. The three last created to serve Brahmins.

The Indian Brahmins neither eat nor kill any sort of animals; and, it is certain, they have not done it for more than 2000 years. The forbearance leads to much practical benevolence, to abhorrence of all bloodshed, and to universal charity.

A Pagoda is a Brahminical Temple, built very massively and elevated, but very small in the interior. Near the door of each is a post for beheading victims.

The Festival of Jaggernaut, in July, is attended by 2 or 300,000 devotees. The image God, and his Brother and Sister Image, are drawn in cars to the Gondicha Nour Temple; and, as evidence of their faith, many devote themselves under the wheels!

It is estimated that there are two millions of Mahomedan and Brahmin Fakirs in India, fanatics who, like the Christian Anchorets, practise self-martyrdom in a thousand absurd austerities and disgusting tortures.

The Fakeers, or Yogees, of the Senese tribe, are a sort of mendicant philosophers, who travel all over Hindostan, and live on the charity of the other castes of Hindoos. They are generally entirely naked, most of them robust handsome men. They admit proselytes from other tribes, especially youths of bright parts, and take great pains to instruct them in their mysteries. These gymnosophists often unite in large armed bodies, and perform pilgrimages to the sacred rivers, and celebrated temples; but they are more like an army marching through a province, than an assembly of saints in procession to a temple; and often lay the countries through which they pass under contribution.

The most wretched class of human beings are the Pariahs, or Hindoos, who, from any cause, have been expelled their caste. Their religious impressions continue without its hopes and advantages, and no other Gentoo will hold the most distant intercourse with them.

In Bengal only, about 700 females have been burnt every year at the funeral piles, or Suttees, of their husbands.

Members of the Hindoo castes may obtain their living in lower castes, but they may not ascend to higher. A Brachman may be a soldier, a husbandman, or a merchant, but neither of these can be a Brahman.—*Colebroke.*

Jumnotree, in the wildest part of the elevated Himalayas, has a temple visited by distant devotees, sacred to the goddess Jumna. Bemderpouch, near it, is 25,000 feet high.

Gangotree, the source of the Ganges, (the holy of holiest) is a small temple to the goddess Gunga, in the most surprizing spot on the globe, and shut in by snowy peaks and falling rocks, inspiring awe and terror. The summit of this holy mountain has five peaks, called Roodroo-Himala, the residence of Mahadeo himself.

Suicide is common, and often considered meritorious among the Hindoos.

The Burmans, who are Buddhuists, adopt, as their presiding deity, Godama. They state that they received this religion from Ceylon; and it is now adopted generally in India, beyond the Ganges. They describe Godama as the last of four gods, *who have lived in the flesh* upon the earth, before they obtained a perfect state. Godama, at 35,

obtained divinity, and preached the law for 45 years, which secnred salvation to all living things. At 80, he commanded his law to be observed by his disciples for 5000 years, and that his images and relics should be worshipped. His law consists of five commandments and ten sins. The commandments are, not to kill any thing; not to steal; not to commit adultery; not to speak falsehoods; not to drink any thing intoxicating. The ten sins are, killing animals, theft, adultery, falsehood, discord, severe language, idle talk, covetousness, envy and malice, false gods. To perform the one, and abstain from the other, secures exemption from decay, old age, disease, and death; besides the privilege of seeing the other gods who are to follow Godama. The other good works are, giving alms, and frequently pronouncing, with solemnity, three words, to remind the party of vicissitudes, misfortune, and fate. Godama, they say, departed 2790 years ago. The temples of Godama are of a pyramidal form, some of them 300 feet high, and often gilt over. Godama is represented as a young man of mild countenance, commonly sitting cross-legged upon a throne, with a book in his left hand, and often of colossal size.

The inhabitants of the Nicobar Islands, in the Bay of Bengal, and of some others in those seas, keep a festival at every change of the moon, by which they establish, hy lunar motion, a seventh day holiday, and an eighth day every fourth time.

Baptism, by immersion in water, is of Hindoo origin, and was spread by them through Asia. The prophets purified the Jews by baptism.

When the English embassy, under Elphinstone, in 1806, went to Caubul, the people of the towns and country through which he passed, believed he conld work miracles, and even animate sculpture. The roads were covered with the sick, lame, and blind, to be touched by him, or he by them; and hundreds were reported to be cured. On his return, he was obliged to change his route to avoid the accumnlation of diseased persons, while no explanations conld remove the popular delusion.

The Hindoos have no less than nine sects of philosophers, whose principles embrace all the metaphysics and speculations of the Greeks, and the objects of controversy among modern Europeans. Three of them are atheistical, and six are partly materialists, and partly spiritualists in certain shades of difference. No justice is done to their profundity in the crude or partizan reports of Europeans. Their *vedas*, or ancient books of ceremonials, and morals, are palpably the foundations of Egyptian and Hebrew knowledge; for example, they contain the Cosmogeny copied by Moses, or by the authors of the Pentateuch; and the entire Book of Leviticus is in them almost word for word; also the entire passage about *the word*, &c. with which the Gospel ascribed to John is commenced.—*Wilford.*

In the centre of Ceylon is a mountain, Hamallel, like a sugar-loaf, and on the top is the print of Boudha's foot, when he ascended into Heaven, about 900 B. C. The area of the summit is 72 feet by 54, and the pretended impression of the foot in the hard rock is covered by a wooden building, and enclosed by a frame of copper, ornamented with precious stones. It is hourly visited by pilgrims from all parts of India.

The natives of Japan, from religious motives, abstain from all flesh meat; but eat the soft sub-marine plants of almost every kind, as the greatest dainties. For these, the fishermen's wives (the best divers of the country) will dive even 30 fathoms. When washed and sorted, these marine plants are regularly exposed for sale in the markets.

In China, &c. the priests, not Hindoos or Mahomedans, are called Bonzes; their god, Fo; and, their temples, Pagodas. In Tartary, the Priests are called Lamas; and, in China, Ho-Changs. Their endowments are splendid, and they worship the same divinity, nnder the forms of various animals, which they allege the soul of Fo has occupied. They are sorcerers and dealers in charms, and have obtained as complete an ascendancy over the minds of the vulgar and women, as the priests of any country; and, in many cases, they prove their own sincerity by imposing on themselves the most frightful punishments. One was seen in a narrow cell, stuck full of nails; others are seen with burning coals on the tops of their heads; others with massive chains fastened to their legs and bodies; all which penances they perform as an atonement to God for the sins of the people. The women are their chief adherents, and the ladies form societies under their direction, called religious; but the mandarins and merchants in general laugh at their impostures.

Fo, the Chinese divinity, or incarnate god, lived about 1100 B. C. At 19, he abandoned his family; and, at 30, began to work miracles; and, at 79, his incarnation ceased. His followers teach that he pre-existed, and had appeared 8000 times in different forms of transmigration. He taught that nothing is the beginning and end of all things;

and that the happiness of man consists in doing nothing, willing nothing, feeling nothing, desiring nothing, and taking no thought for the future. His disciples teach that he came on earth to expiate men's sins, and his four precepts are to kill no living creature, to take nothing that belongs to another, to utter no falsehood, and drink no wine.

The Chinese have several great festivals; the religion of the people is divided into many sects; but, in the temple devoted to heaven, in Pekin, called Tien-tan, the emperor sacrifices animals at the winter solstice; and, at the temple of Tee-tan, he sacrifices to the earth at the summer solstice; again, at the temple of Ge-tan, or of the Sun, sacrifice is performed at the vernal equinox; and, at the Temple of U-tan, or the Moon, sacrifice is performed at the autumnal equinox. At the vernal equinox he holds a plough, and sows the first seed which is sown in the empire; and a cow is sacrificed in the Tee-tan, or Temple of the Earth. The feast of the new year and of the first full moon of the year, and some others, are held as days of festivity, for no sabbath is kept in China. The Jews, in China, are the principal silk manufacturers, and they settled about 250 B. C.

So late as 1814, the Emperor Kia-king published, in the Pekin Gazette, that a rebellion had been crushed, owing to the image of the god Kevanté having appeared in the air during the contest; and that an assault on a city was repulsed, owing to a spontaneous flame arising from the Temple of Kevanté.

Patience, obedience, gravity, and taciturnity, are the cardinal virtues of Confucius, or Chee-Koong. His works are, the *Ou-king*, in five books, and the *Se-shoo*, in four books. Marshman and Morrison have translated them, but they contain far more chaff than wheat, though highly curious as productions of 2630 B. C. in the reign of Hoang-tee. So say all his biographers and the Jesuist Missionaries.

ANCIENT WESTERN MYTHOLOGY.

Baal, or the Sun, was the God and object of worship of most ancient nations. The Phœnicians called the sun Beelsamen, Lord of Heaven. A Bull-calf, or Bull, was his emblem, and he was thus worshipped in Egypt; and, from this cause, the bull was doubtless adapted as the first sign of the zodiac, which would carry its invention back about 5000 years. Baal, Bel, and Belus, was the God of the Assyrians, Babylonians, and Carthagenians; and Apollo was his other name in Greece. In Ireland and Scotland, to this day, there are Baal Cairns, or Altars; and the people, both in Ireland and the Highlands, pass through fires, at what they still call the Baal-ton, on Midsummer eve, eating eggs, and practising various ceremonies. The Peruvians and other Americans were also sun worshippers.

The Gods of the ancient Egyptians were at least forty in number. Cneph was their earliest deity, and parent of Phthah, a sort of Vulcan, who had a wife named Neith, equivalent to the Grecian Minerva. Re, or Phre, was the Sun, and constantly referred to on the monuments translated by Champollion. Rhea, or Urania, was the Genius of Astrology, and the wife of the Sun, and the sister of Cronus, their first king. Then there was Joh, the Moon; and Apopis, a brother of the Sun; and Cronus, or Saturn; and Thoth, or Taaut, called Hermes, or Mercury, to whom the Ibis was sacred.

Osiris, the Egyptian Bacchus, was the presiding Deity of their Temples, and the son of the Sun and Rhea; he was typified as a hawk, and his hieroglyphic is an eye and a sceptre. Typhon, the Author of Eclipses, resided in the constellation of the Great Bear. Isis was the daughter of Thoth and Rhea, and the Deity of Fertility and Maternal Love; her soul was transferred to the Dog-Star, or Thothis. Horns was the son of Isis and Osiris; his soul is in the constellation Orion. Anubis was figured with a dog's head, and was the offspring of Osiris and Nephthe. Amun, the Jupiter of the Egyptians, worshipped as a human figure, with a ram's head; the same from whom Alexander the Great claimed descent. Apis was a Bull consecrated to Osiris, whose soul resided in him, and he was fed with divine honours. Herodotus made eight ancient Gods and twelve modern Gods of the Egyptians; and Diodorus calls the eight senior Gods, the Sun, Cronus, Rhea, Amun, Juno, Vulcan, Vesta, and Mercury. The Greeks, as foreigners, must, however, have misconceived many of these accounts.

The Bull, or Bull-calf, was dedicated to Osiris, as the inventor of agriculture, and probably of the plough. It was feigned that his soul passed into one that was black, had a white square mark on the forehead, an eagle on the back, and a white crescent on the side. Such a one was treated as a very god; and when he died, all Egypt mourned; and when another was found, the country was filled with rejoicings. Those who suppose that Osiris was the Sun, or Baal, imagine that the Bull was his emblem. The Golden Calf of the Jews had this origin; and the *fetiches*, or animal worship, of the African na-

tions, at this day, are continuations of the same superstitions; for, it appears, that nations may be so deluded as to worship any thing.

In the Egyptian hieroglyphics, figures sitting on the gronnd, in an upright attitude, signify a god or goddess. Phree is drawn like the common astronomical character of the sun. Joh, as a crescent. Osiris, as an eye. A human figure, sitting with the hands extended, represents a man. Eternity is drawn as a serpent; and Life as a key, like the sign for Venus.

The Egyptian Osiris was drawn as a sceptre and an eye, or as a hawk, or with a mitre and two horns, a whip, and a staff, and the Bull was his living symbol. Isis, as a woman with a globe, and ears of corn, or with cow's horns, a cymbal in her right hand, and a pitcher in her left. The Cow was her symbol. Osiris was a king, and Isis his wife. He was killed by his brother, and she ordained his worship. Apis was an ox, with peculiar marks, into which Osiris was supposed to enter. Typhon was the genius of evil. Horus was the son of Osiris; and Isis was an emblem of the sun. Harpocrates was the god of silence. Anubis was drawn as a man, with a dog's head, a caduceus, and a branch of palm.

Anubis, the Egyptian Deity, with a dog's head, was so called after Sirius, the dog-star; and Bruce says, that dog is Seir, or Siris.

The Dagon of ancient nations was a human figure, with lower extremities like a fish.

Astaroth is the scriptural name of Venus, worshipped by the Phœnicians and Syrians, to whom some fine temples were built, and, in one of them, there were 300 priests.

Hammon (to whose name the Greeks prefixed Jnpiter) was some hero, real or fabulous, Indian or Egyptian, supposed by some to be Ham, the son of Noah; and by others, to be an Egyptian legend of the Indian Brahmah.

The Persians called the good and evil genii of Natnre, Yezed, or Ormoyd, the Creator, answering to the Greek Oromasdes; and Arimanios, or Ahriman, who was their evil dæmon.

The four most ancient orders of priests, the Rabins, the Brahmins, the Magi, and the Druids, confined themselves to vegetable food; as did also the Athenian prince, Triptolemus, who established the Eleusinian Mysteries, and prohibited, by law, all injury to animals.

The ascendancy of astrology for 3000 or 4000 years, in the civilized world, is proved by every record. The Gospel of Mary tells us that Jesus knew the virtues of the planets and stars, and their *sextile*, *quartile*, and *trine* aspects. Our William Cecil, Lord Burleigh, calculated the nativity of Elizabeth; and she, and all the European princes, were the humble servants of Dee, the astrologer and conjuror! The signets of princes were the sign ascending or planet presiding: thus—Augustus used the sign ♑, which ascended at his birth. In the East, to this day, the minister is either an astrologer, or the chief astrologer is minister.

The Gods of Greece were the royal family of Crete, about 1500 or 1450, whose names some classifier or adulating astrologer gave to the planets, &c. Astrology, superstition, poetry, and legend then made up, in after-times, all those extravagancies, which, even to this day, pedants force on the rising generation. Such an effect would not at the time be anticipated; but as the associations with all the circumstances of good and bad fortune, in every horoscope, were those of apparent cause and effect; so false associations, some mistakes, many exaggerations, much credulity, and the crafts of superstition and mystery could not fail, in 2 or 300 years, to convert the names into those of deities. They lived in the dark ages which preceded the heroic, and just before the introduction of the art of writing; that is, in the 15th century B. C., 2 or 300 before Orpheus, and 5 or 600 before Homer, quite time enough for astrology and legend to embody the stories in Orpheus, Hesiod, and Homer. Who afterwards would dare to tell the truth? and those who did, fell victims like Socrates.

The whole may be explained thus:—

The name of *Cœlus*, the father of Saturn, was assigned to the highest sphere, that of the stars.

Saturn's name was assigned to the planet of the colour of *iron;* because that metal was discovered, in his time, by an electrical conflagration of the woods on Ida; and, in power, iron in that day would be as the gunpowder of the moderns. Then, as the planet was 30 years, or the period of a generation, in its orbit, we readily trace Saturn's poetical connection with *Time*, and its personification in the *Scythe*. Again, his planet was malefic, owing to his crimes; and unfortunate, owing to his expulsion and exile.

Jupiter, the reigning monarch, had his name assigned to the most splendid of the planets, and also the most fortunate; hence he became the patron of so many places and distinguished men. Times for building, fighting, &c. would be elected when Jupiter was the strongest in the horoscope.

Mars, from his fiery aspect, was named after a son of Jupiter, born in Thrace, and educated in the military service; Crete, from its possession of iron, being at that time a conquering country.

Apollo was another son of the polygamist, Jupiter, and probably, in the Cretan court, was flattered as a prince who played the lyre and patronized music; but, of course, the Sun had also a vulgar name.

Venus was, beyond doubt, the wife of Vulcan, another son of Jupiter, who, after the discovery of the art of smelting iron, derived his revenues from the iron works at Ida, like our Duke of Cornwall, who derives such large revenues from tin and copper. She came from Cyprus, or, as to Crete, in oriental language, out of the sea. Her beauty and her sex qualified her to give a name to the other fortunate planet.

Mercury was the name given to the inner planet, in compliment to another son of Jupiter, called, after the Egyptian or Phœnician, Thoth, Taut, or Hermes. He is deemed the messenger of the Gods, because, by his rapid direct and retrograde motions, he passes to and fro among the planets, a circumstance much regarded in astrological predictions.

The *Moon* appears to have been called *Cybele*, after the mother of Jupiter, and also *Diana*, after his daughter; but, having a previous vulgar name, the astrological was less fixed. She was strongest in the horoscope of Ephesus, and thence the Temple of Diana.

In this obvious theory, every one who can solve a horary question, or direct a nativity, will concur. At the same time, it is not meant that astrology was then invented, only that appropriate national Greek or Cretan names were adopted in rejection of less obvious Hindoo, Bactrian, Chaldean, or Egyptian names. The subsequent mythological sense could not be anticipated, and the parties thought, perhaps, as little of the compliment, at the time, as the moderns think of islands being called after them in the South Seas. In the main, the whole Pantheon of the Gods of Greece, Rome, &c. may be explained by this key. In confirmation, Sanchoniathon expressly ascribes the godship of Ilus, Saturn, to a star being called after him; and Hyginus says the same of Perseus. The numerous and absurd progenies, ignorantly ascribed to the Gods, arose merely from their planets presiding or governing in a nativity; thus, a man was called a son of Jupiter, or Mars, or Venus, if those planets were governing at his birth, his conception, &c.—*Editor.*

Orpheus taught that the universe is God, whom he denominates Zeus, thus:

Zeus was the first progenitor.
Zeus is the distant thunder.
Zeus is the head and the middle.
Zeus is the substance of all things.
Zeus is the male procreator.
Zeus is the divine bride.
Zeus is the depth of the earth.
Zeus is the starry heavens.
Zeus is the spirit of the winds.
Zeus is the raging fire.
Zeus is the base of the sea.
Zeus is the sun and moon.
Zeus is the universal king.

Thus, all embodied things are the vast Zeus.

Cicero states, that Pythagoras conceived the Deity to be the pervading soul of all nature, and the self-moving principle of all things; of which the spirit of all animals is a portion. The divine emanation produced three orders of beings—gods, demons, and heroes.

The Chaldeans taught that the Deity is pure ethereal fire, or light, and that the perfection of his creations depends on their proximity to their source.

The most respectable and diffused of the western religions, in primitive ages, was the Druidical. It is noticed in the article *English History*.

Aguilanneuf was the name of a feast of the Druids, and adopted by the Christians; when, at the entrance of the sun into Capricorn, they went in solemn procession, of priests and chief men, to the forests to gather misletoe, the preservation of which kept off evil during the year. Throughout England misletoe is still put up in houses at that time, as in the days of the Druids; and, in many French provinces, the *Aguilanneuf* is sung by children at Christmas season.

It was pretended that, to appease the gods, they demanded offerings, gifts, or oblations, called sacrifices; and after the ignorant votary had brought these to the temple, the priests offered them on an altar, and, amid various mummeries, burnt the useless parts, and afterwards feasted on the remainder. The donor, on making the offering, made a public confession of his sins, for which the offering was an *atonement*, and, of course, guaranteed by the priests. Flour and salt, called *mola*, were put on the head, and wine sprinkled, called *libare*. The priest, or *aruspex*, then took out the entrails, and, after some hymns, &c. the carcase was removed for the use of the priests.

The Greek philosophers were called unbelievers—of the fictions of fancy, of witchcraft, hobgoblins, apparitions, vampires, fairies, of the influence of

stars on human actions, miracles wrought by the bones of saints, the flights of ominous birds, the predictions from the bowels of dying animals, expounders of dreams, fortune-tellers, conjurors, modern prophets, necromancy, animal magnetism, charms, amulets, and an endless variety of follies;—these they disbelieved and despised; but they always bowed their heads to truth and nature.

Augury was the art of foretelling by the flight or chirping of birds, and this feeling still protects the robin, and confers odium on the crow and raven. It was a leading business in state and priestcraft among all ancient nations, and the augurs enjoyed pre-eminence and impunity. Most of the famous Romans were augurs; and Romulus and Remus established a college for its cultivation as a science. If the poor victim made resistance,—if there was any uncommon appearance in the viscera,—if any accident took place,—if the flame did not rise steadily,—it was unpropitious. Such was the wisdom of these renowned people; and, for laughing at such things, their philosophers and greatest heroes were often banished or destroyed by the priests, aided by the ignorant public voice.

The Nazarites were the Gentoos of Western Asia, who abstained from alcobol and animal food, and never cut or shaved their hair.

The Sabœans or Star Worshippers of Arabia derived their name from Sabâa, a rising star.

The Anzicos, or Giagas, in Africa, worship the sun and moon; perhaps the Osiris and Isis of the Egyptians, for the Giagas are scattered throughout Africa.

Zingha, Queen of the Giagas, in Africa, whose atrocities, for half a century, were without parallel, turned Catholic, (at least so say the lying missionaries,) at 65, and died in 1663, at the age of 81.

Strabo says, the Persians called the circuit of the heavens God, and worshipped the Sun, Mithras, as his emblem, considering lightning as one of his arms. They considered his angel, Oromasdes, the author of good, and the demon Ahrimanes the author of evil. They taught emanations of ranks of being, like Pythagoras.

The Pagan cause was sustained against Christianity, in the reign of Theodosius, by the eloquence, zeal, and high character of the Prætor Symmachus. St. Ambrose was opposed to him, and so favoured by the Emperor, that at length Symmachus was silenced by temporary banishment. He identified the glory of Rome with the gods and their accustomed worship.

MAHOMEDANISM.

The Mahomedan religion is itself a practice of urbanity, charity, and sobriety, yet despotic governments render the countries subject to it the most wretched on earth. Beaufort, in his account of Caramania, describes the rapacity of the pachas, who, being obliged to send tribute and presents, and being desirous also of getting rich, are so oppressive that no man dare aspire to be wealthy, or appear to be so; hence idleness, ignorance, and want, characterize the finest climates and most productive regions in the world. To exist in obscurity, from day to day, and to satisfy animal wants, is the practical wisdom of these wretched countries, while priestcraft unites with the governors in debasing the mind, and these in debasing the condition of the people.

The Mufti is the primate of Moslemism. He has power of pardon in all criminal cases.

The Mahomedan Iman is the Chief-Priest of a congregation.

There are two sects of Mahomedans, that of the Arabians and Moors—the Persians, the Turks, and the Tartars.

Mahomet wrote the Koran in the Koreish Arabic, which he asserted was the language of Paradise, and it is considered as possessing every fine quality of a language. It has 1000 terms for sword, 500 for lion, 200 for serpent, and 80 for honey. It is spoken and written all over Asia and Africa.

Mahomet asserted that the Koran, or *Kaara*, was revealed to him, during a period of 23 years, by the Angel Gabriel. It is divided into 114 sections, or *suras*, and these into verses, or *ayats*.

Mahomet despised the pomp of royalty, and submitted to the menial offices of the family. He kindled the fire, swept the floor, milked the ewes, and mended, with his own hands, his shoes and his woollen garments. Disdaining the penance and merit of an hermit, he practised, without effort or vanity, the abstemious diet of an Arab and a soldier. On solemn occasions he feasted his companions with rustic and hospitable plenty; but, in his domestic life, many weeks would elapse without a fire being kindled on his hearth. The interdiction of wine was confirmed by his example; his hunger was appeased with a sparing allowance of barley bread; he delighted in the taste of milk and honey; but his ordinary food consisted of dates and water. Perfumes and women were the two sensual enjoyments which his nature required, and his religion did not forbid them.

Gibbon.

His enemies said, that Mahomet was assisted in writing the Koran by a Jew, Bensalon, and by a Monk, Sergius; but he himself refuted the charge. The Koran was a rhapsody, in the purest Arabic, and often very sublime. It contains 3000 verses. In the 10th chapter it exclaims, "who but God can have composed the Koran;—try to write one chapter, and call to your aid whomsoever you please."

But, for the timely victory of Charles Martel, near Tours, all Europe, as well as Asia and Africa, must have become Mahomedan.

Arot and Marot were the names of the two angels who waited on Mahomet. The Koran was brought in chapters by Gabriel.

Mahomet alledges that Christ was not executed, on the authority of the Arabian sects of Christians.

It is a vulgar error that Mahomet teaches that women have no souls. He teaches, on the contrary, that they go to heaven, and enjoy perpetual youth and beauty. His followers may have four wives, but few have more than one.

The Wahhcbites, in Arabia, now extensively spread, teach that God is the only object of adoration; that Moses, Jesus, and Mahomet were merely great men; that no books are inspired, &c.

The Mahomedan religion acknowledges but two temples—Mecca and Jerusalem. They are called *El Haram*, and other mosques are called *El Djammaa*, or meeting houses. Jerusalem, they say, is guarded by 70,000 angels, and the spirits of prophets perform there their daily devotions. No infidel can enter it, and Mussulmen walk through it barefoot.

At Mecca the holiest things are the well Zemzem, that of Hagar and Ishmael, which has its source in Paradise; the Kaaba, or House of God, built by Abraham; and the black stone in one of the angles, consecrated by Abraham. Pilgrims walk seven times round the Kaaba, a four-sided tower, 34 French feet high, and 31 at the sides. From the Kaaba, the pilgrims, 80,000 in number, make seven walks round the two hills of Saffa and Merona, after which their heads are shaved. They afterwards visit Mount Ararat, where Adam and Eve met after their expulsion from Paradise, and built the first house, still standing.

From Ararat they pass, en masse, to Mosdelefa, to say the asea, or night prayer, and there each throws seven stones at the house of the devil, an ancient building in a narrow space. The Paschal sacrifice is then offered. The next day they pelt two pillars erected by the devil, and repeat the pelting at his house. Seven other walks round the Kaaba, and another salute of the black stone finish these mummeries, as far as deemed essential. But others throw seven stones at the house where Abougebel, the enemy of Mahomed, resided, and once more go the circuits of the hills. To the eredit of our race, these follies are rapidly abating, and Mecca is in decay.

The Mahomedan Lent is called Ramadan, and kept in the 9th month.

Friday, the Mahomedan Sabbath, is kept as a festival.

Allah, Allah, is, in Turkish, the name of God. In battle, their soldiers cry "Allah, Allah, Allah."

Caliph, in Arabic, means Vicar, or Apostle. The first was Abubeker, the successor and father-in-law of Mahomet, and Editor of the Koran.

The Turks allow no infidel to look at the Standard of Mahomet; and when it was carried in a procession, about 1768, several hundred Christians, who ignorantly looked on, were massacred by the Turkish populace.

The Faquirs, or Anchorets of Barbary, are called Marabots, and equal their counterparts in fanaticism and imposture. They pretended to smell a Jew, or Christian.

The Mahomedan religion prevails entirely in central Asia, Eastern Europe, North and Middle Africa, Egypt, and more or less through Hindostan, the Indian Archipelago.

Dervises are the monkish and missionary impostors of the western Asiatic nations.

The Wahabees are a sect of Mahomedan Puritans, founded about 75 years ago, by Abd El Wahab and Ibn Saoud.

Circumcision is practised by most eastern and some African nations, and is rendered necessary by a peculiar conformation.

THE JEWS.

The Magi called their religion Kish Ibrahim; the Hindoos claim Brahma, and the Jews Abraham. The Arabs say he founded Mecca, and call him Ibrahim. He was, in Asia, like the Odin of the Scythians, or the Hercules of Greece. Philo says, his father, Terah, was, in Chaldea, a maker of idols. He had one son by Hagar, called Ishmael; one by Sarah, from whom the Jews claim descent; six by Keturah; and also sons by concubines, whose numbers are not mentioned. Gen. xxv.

The names of Adam, Noah, &c. were unknown till the Jewish scriptures begun to be circulated after the Chris-

tian era. The Brahmins had an Adimo, and Procriti, his wife, in their Vedam, or Second Law after the Shasta.

The Jews divide their scriptures into 22 books, equal to the number of letters in the alphabet. The Christian division of them is into 39 books. The Pentateuch is but one book with the Jews. Ezra, at Babylon, translated the whole into the square Chaldaic character, now called Hebrew, and abandoned the elder Phœnician character.

The most ancient known copy of the Jewish Scriptures, possessed by the Jews, was that of the Rabbi Hillel, who lived at Toledo about the year 1000. Those of Ben Asher, of Jerusalem, and Ben Naphtali, were made about the year 1100.

The Greek Septuagint was formed about 280 years B. C., in Egypt. Some say by 70 or 72 translators; but Hewlett says, in 70 or 72 days.

This translation was made under Ptolomy Philadelphus, King of Egypt, for the Alexandrian Library. Justin Martyr says, that the 72 were shut up in 36 cells, and that each pair translated the whole; but that, on subsequent comparison, it was found that the 36 copies did not vary by a word or a letter.

Philo, in his analysis of the doctrines of Jews, says the deity contains all things, and is contained by none. He describes three emanations, the *Logos*, or divine intellect, and the creating and the governing principles. Before the creation, he says, space was filled with the OR HÆEN SOPH, or infinite intellectual light, whose first beam was Adam Kadman, and the next the ten Sephiræ, intelligence, knowledge, wisdom, strength, beauty, greatness, glory, stability, victory, dominion. Four worlds were also produced, Aziluth, emanation; Brish, creation; Jegirah, forms; and Asiah, matter. Beings and spirits are less pure, as more distant from the En-Soph. The human soul consists of Niphish, vitality; Ruach, motion; Mehamah, intelligence; and Jechidah, worship.

The word *Bible* comes from *Biblos*, the name of the reed of which paper was anciently made. The Jews divided the Pentateuch into 50 sections, marked with Pe, and retained in our translations as a ¶. Tyndal's translation, still used in the Common Prayer, has no verses.

Hebrew had no neuter gender; hence, in the Bible, every thing is personal, is masculine, or feminine. Elohim and Jehovah, heaven, water, are masculine; the earth is feminine. When, therefore, Jehovah is said to be all, he includes all persons and personalities in himself; and, hence, many of the peculiar figures of the Jewish scriptures, and the notions about emanations and the proximity to Elohim, or the Logos, of gods, demons, and heroes, for these apply by personalities to natural objects, all of which are persons, and designated as he and she, and never by it. Even adjectives apply to personal qualities, and verbs to personal actions, to every inanimate or animated existence, and Jehovah is therefore the UNIVERSAL HE, or all things are in HIM, by the mere form of speech. God was seen in all things, and all things in God.

The Greeks had no word, says Rose, to express creation out of nothing. The Septuagint uses the same word for the *creation* of man out of earth, as for the *creation* of the heavens and earth.

The Hebrew word translated *days* in the account of the creation in Psalms lxxxii. ver. 2. Num. iii. ver. 13. and Isaiah xxx. 26. is translated *times*, or periods; for, of course, there could be no *day* of 24 hours, before the alledged creation of the Sun on the third day.—*Grotius*.

It was 8 degrees, or about 560 miles from Jerusalem to Babylon, and the same radius comprehended Lower Egypt, Crete, the Northern half of Arabia, and a large portion of Asia Minor. Ten degrees, or 700 miles, extended to Mecca and Constantinople.

The land of Goshen was on the Eastern side of the Nile, in the Heliopolitan nome.

By Mosaic appointment, the Jews celebrate a jubilee every 50 years; and, by the appointment of the Pope, one is celebrated at Rome every 25 years.

Bishop Watson thinks the Sabbath was as old as the creation; but others think it was an institution of Moses. All agree that it is the seventh day, or *Saturday*, and that, on that day only, men ought to abstain from labour.

Questions about the site of Eden have greatly agitated theologians; some place it near Damascus, others in Armenia, some in Caucasus, others in Arabia, and some in Abyssinia. The Hindoos refer it to Ceylon; and a learned Swede asserts that it was in Sudermania. The village, nearest to the ruins of Babylon, is called Hillah, and many theological writers contend that it was the site of Adam's paradise.

Hewlett, in his Bible, ascribes the destruction of Sodom and Gomorrah to an earthquake and volcanic eruption, which would rain fire and brimstone round the country. He observes, that Lot's wife, while lingering behind, would be suffocated by the vapours.

The same author ascribes the alledged

age of the Patriarchs to misconception of the mode of enumeration, and observes that the discrepancies of the various texts, in 14 instances, always differ by even hundreds.

Apamea, in Pyrygia, claims to be the place where Noah's ark rested, for ancient medals are said to have been struck there, with a chest on the waters, and two doves, with the letters "NOE" on the chest. Its ancient name was Cibotos; and near it are the mountains of Celœnæ, on which the priests alledged the ark rested. It is 300 miles west of Ararat, and 100 east of Smyrna.

Captain Beanfort describes a burning naphtha spring on the coast of Carimania, of which there is a tradition that it was the identical burning bush of Moses.

The Jewish Sanhedrim consisted of 70 elders; and hence, probably, the 70 translators of Josephus.

The *Misna* is the collection of the Civil Laws of the Jews, in addition to those of Moses.

The Targums were learned interpretations and paraphrases, written in Chaldaic, and greatly revered by the Jews. The most learned of these commentators was Onkelns and Jonathan.

The Talmuds are digests of doctrine; and the Mishner contains the oral, or second law of the Jews, compiled at Babylon, by Judah. To which is added, the Gemera, by Rabbi Asa, a commentary on the Mishner.

The Masora and Cabala were mystic interpreters and recorders of traditions. The Saducees rejected all the books but the Pentateuch. The Pharasees professed extra sanctity. The Essenes were recluse devotees.

Josephus relates that Ptolomy Philadelphus gave the Jews above a million sterling, and 120,000 Jewish slaves in exchange for a copy of the Old Testament, which was translated by 70 separate Jews, for which he paid them another half million, &c. This is the Septuagint.

Much learned controversy has taken place in all ages about the Septuagint and its origin; one party sustained by Aristeas, Philo, Josephus, Eusebius, &c. maintaining the embassy from Ptolomy Philadelphus, and the miraculous uniformity of the 70; and the other asserting the falsehood of this story, and alledging that it was a translation made for the use of the Hellenist Jews of Alexandria, before the Christian Era.

The Septuagint is in the Idiom of Alexandria, generated in two centuries by those Grecian Colonists. The peculiar Greek of the New Testament had the same character, and their extensive use vitiated the Greek language. Many words in both are in new senses, or new to the language; in fact, Colonial Greek.—*Villoison.*

The Vulgate is a Latin translation of the Greek copies of all the Books of the Old Testament, by Jerome; and, of the New Testament, as approved by the Council of Trent.

The Councils of Chalcedon, &c. recognized this translation as canonical, but, at the Reformation, the Protestant Divines finding that certain Books were in no Hebrew copies, pronounced them apocryphal, and they constitute the apocrypha of Protestant bibles.

Aquila, in 128 A.C., translated parts of the bible into Greek. Jerome into Latin in 400, Munster in 1535. Junius and Tremellius in 1587, and Parker in the same period.

It has been maintained, that the Ecclesiasticus is a production of Jesus, the founder of the Christian religion, called Jesus, the Son of Syria, the epoch of the battle of Actium being referred to in the preface, and the morality and doctrines being the same.

To David is ascribed 70 of the Psalms. Others were written by Asaph, Ethan, Heman, Moses, and Solomon. The version in the common Prayer Book is from the great Bible by Tyndal, Coverdale, and Cranmer, and Coverdale was their translator. The : in the middle is a guide to the chanting. The Bible version is from James's translation in 1603.

The oldest version of the Old and New Testament, belonging to the Christians, is that in the Vatican, written in the fourth or fifth century, and published in 1587. The next in age is the Alexandrian MSS., in the British Museum, presented to Charles I. by the Greek Patriarch, and said to be copied by Thecla, an Egyptian lady, of the fourth century. The New Testament part was published in 1786.

Besides the Hebrew version there is a Syriac version, and a Samaritan Pentateuch. The Samaritan was the copy of the ten tribes, and Usher procured copies of it from Syria. It omits certain speeches which are in the Hebrew copies, and is in the ancient Hebrew character.

The Spanish Jews have the oldest Hebrew copies, about 6 or 700 years old; the Samaritan Pentateuch, at *Sichun*, is 500 years old. Two in the Bodleian and Vatican are believed to be 1,000 or 1,100 years old.

It appears by Samaritan copies, printed in our Polyglot, and abroad, and by imperfect copies of the same, found among oriental jews, that before the time of Ezra, their scriptures

consisted only of the Pentateuch. The Samaritan Jews had a book of Joshua, different from the vulgate, but they read it as apocryphal.

Ezra, about 520 B.C., revised and arranged the whole of the Jewish records, and Simon the Just, about 250, added the two Books of Ezra or Esdras, which we call Ezra and Nehemiah, also Malachi. The modern Jews all over the world regard Ezra as one of their chief founders. They respect the Pentateuch as authority; the histories and prophets as sanctioned by Ezra and Simon; and the Psalms, Proverbs, Job, Song of Solomon, and Ecclesiasticus, as works of edification. They do not recognize our Apocrypha.

Our division of the Bible into chapters was made by Archbishop Langton, and perfected by Robert Stephens. The verses were perfect lines in copying in manuscripts, *versus* meaning to turn, but corrected by Stephens.

Other authorities state that the division of the Old Testament into chapters was made by Cardinal Caro, about 1250, and into verses by one Athias, a Jew of Amsterdam, in 1661.

Jerome's Latin version of the Old Testament, from Greek versions at Alexandria, was confirmed as canonical by the council of Trent, and as then amended is still received in the Catholic church. The Protestants, however, rejected as Apocryphal Tobit, Judith, the Wisdom, Ecclesiasticus, Baruch, and the two Books of Maccabus; and they changed the name of Esdras I. and II. to Ezra and Nehemiah, because the text did not exist in Hebrew.

Josephus asserts, that he saw the pillar of Lot's wife; and Justin Irenæus and Tertullian alledge its existence in their time.

Longinus, who lived about 270, was the first of the ancient writers who quotes from Moses.

Genesis speaks of the sons of God who sought the daughters of men, and whose children were giants, and of old, mighty men of renown; and this points to the heroes of the mythology of all the Asiatic and early nations, about whom we are in darkness, owing to some truths being disguised by much fable. Faith in the Jewish records seem to leave no alternative, but to admit a foundation in truth to the Gods of the Egyptians, Hindoos, Greeks, Etruscans, and Scandinavians, whose varied traditions on the same subject exactly tally with this second, third, and fourth verses of the sixth chapter of Genesis.

The passage about woman being made from the rib of a man, Bellamy, referring only to the Hebrew, asserts, means simply that she was *brought* to his side, not taken out of his side.

One Bencochab set up for Messiah in the reign of Adrian, about the year 130; but the emperor burnt Jerusalem, slew 500,000 of the followers of Bencochab, and then rebuilding Jerusalem, called it Ælia; and, to annoy the Jews, placed the figures of hogs over its gates. He was the same emperor who caused the wall, 80 miles long, to be built from Newcastle to Carlisle, to hinder the marauding excursions of the Scots and Picts. He died in 138, after a reign of 21 years. Among his severe persecutions of the Christians, he erected a Temple to Jupiter, on Mount Calvary, and a Temple of Adonis, on the manger at Bethlehem.

The number of Jews, in 1826, was estimated at 3½ millions. Half a million in Austria, and half in Africa; 12,000 in Great Britain.

WITCHCRAFT AND DEMONOLOGY.

James I. published "Dialogues of Dæmonologie," printed first at Edinburgh, and afterwards in London, and praised by all who sought his favour. Parliament, to flatter him, made their twelfth law against witchcraft; inflicting death "if any person shall use any invocation or conjuration of any evil or wicked spirit,—shall entertain, employ, feed, or reward any evil or cursed spirit,—take up any dead body to employ in witchcraft, sorcery, or enchantment,—or shall practise, or shall exorcise, any sort of witchcraft, sorcery, &c. whereby any person shall be killed, wasted, consumed, pined, or lamed." This being the law of the land, no person presumed to doubt the fact; hence Shakspeare gave countenance to the error, and the learned Bishop Hall mentions a place where, he said, there were more witches than houses. Allaying of ghosts, driving out evil spirits, and abjuring witches, became, in consequence, for a century, a profitable employment in the clergy of all denominations. Witch-finders existed, too, as public officers; and, besides the public executions, which disgraced every assizes, multitudes of accused were destroyed by popular resentment; while others were drowned by the test applied, for if, on being thrown into a pond, they did not sink they were presumed witches, and either killed on the spot, or reserved for burning at the assizes.

When Alfonso, King of Castile, gave his royal sanction to astrology, he denounced soothsayers, sorcerers, and wizards,—"all who take their tokens from birds or omens, who cast lots,

who see visions in water, crystals, mirrors, or sword blades; make amulets, practise palmistry, or consult dead heads."

Magic originated in the east, and was spread as a science by the Saracens. Alphonso the Wise caused the magical system of King Piccatrix to be translated, in 1256, from the Saracenic into Latin. Artabel and Clavicula Salomonis published similar systems, which, for 300 years, bewitched the learned.

Ashres were branches used by ancient pretenders to magic, as *blessers*, and similar to the wands put into the hands of conjurors. They are forbidden to the Jews, but, by mistake, have been translated groves, &c. Ashaphs were astrologers.—*Landseer*.

The Hindoos, Chaldeans, Persians, Jews, &c. had angels,—classes and hosts of them; and the Shastah has a story very like that of Milton. The Jews had ten orders of them. The popes have recognised nine choirs and three hierarchies, consisting of cherubim, seraphim, thrones, dominions, virtues, powers, principalities, archangels, and common angels. Paul, in his Colossians, speaks of the invisible thrones, principalities, dominions, powers, and often of angels. Peter and Jude speak also of the fallen angels. The *Malakin* were the messengers, the *Elohim* were gods, the *Ben-Elohim* were the sons of gods, &c. &c. Thomas Aquinus says, that God sits on the cherubim and seraphim. Scott, in his discovery of witchcraft, says there are thousands of millions of them, good and bad!

The Jews reckoned four orders of angels under the archangels, Michael, Gabriel, Uriel, and Raphael. Daniel makes mention of Michael and Gabriel; and Tobit was familiar with Raphael. Devils were classed in legions. Satan is a Chaldaic word. Beelzebub, Hebrew; and Devil comes from the Scandinavian *Deva*, their genius of evil. The Mahomedan priesthood teach that Azazil was the name of the fallen angel. Dr. Dee used to call them and converse with them,—Uriel was his favourite; and the learned Casauban, under the patronage of King James and Lord Bacon, published two volumes, in folio, of Dee's conversations with them.

St. Jude alludes, verse 9, to an ancient Jewish Life of Moses, still in existence, which describes a contest between a bad angel, Samael, and Michael, Gabriel and Zinguiel, about carrying away the soul of Moses.

St. Paul speaks of his visit to the third heaven; and Mahomet makes out seven from this hint. The first is of silver; the second of gold; the third of precious stones, in which there is an angel so large, that it is 70,000 days journey between his hands; the fourth heaven is of emerald; the fifth of crystal; the sixth like fire; and, the seventh, is a delicious garden, with fountains of milk, honey, and wine; and with apples, whose kernels turn into the most lovely females, and it is guarded by angels, one of vast size with a cow's head, another with 70 mouths, each speaking 70 languages, &c. &c. &c.!

Thomas Aquinas, styled "the angelical doctor," published 17 volumes on the most abstruse metaphysical subjects. In his great work, "The Sum of all Theology," there are 358 on angels, and 83 on demons. In his treatise on *angels*, he investigates their substance, orders, offices, natures, habits, &c., and his conclusions are minute and positive. "Angels," says he, "were not before the world! Angels might have been before the world! Angels were created by God.—They were created immediately by him.—They were created in the Empyreal sky.—They were created in grace.—They were created in imperfect beatitude.—They are *incorporeal*, compared to us, but *corporeal*, compared to God.—An angel is composed of action and potentiality.—Every angel differs from another angel in species.—The bodies assumed by angels are of thick air.—Many angels cannot be in the same space.—The motion of an angel is the succession of his different operations. The velocity of the motion of an angel is not according to the quantity of his strength, but according to his will.—The motion of the illumination of an angel is threefold, or circular, straight, and oblique," &c.

Amulets, or charms, were anciently worn by all, and sanctioned by religion, astrology, medical, and other sciences. The Pope and the Catholic clergy make and sell them to this day, and all nations still use them more or less. The same species of faith which gives credit to them, gives credit to attraction, repulsion, caloric, and other powers still taught in the schools of philosophy. Time and reflection can alone eradicate all such superstitions. Some are used to cure diseases, others to prevent them; some prevent drowning; some keep off the devil, others protect against witchcraft; and there are medical practitioners who still prescribe and sell them for gout, ague, rheumatism, plague, fever, &c. &c.!

Precious stones being worn as charms and amulets, were in time regarded as the local habitation of good spirits, and, in desperate cases, used therefore to

be prescribed as powders for many internal diseases. Every twentieth family in London preserves hot-cross buns, a mouldy stinking pinch of which is deemed infallible for the cure of dangerous bowel complaints. A child's caul is an heir-loom in many families, as a security against drowning, and often sold at a high price. Bacon and Boyle abound in these follies; Shakspeare sanctified them, and Digby, Ashmole, Aubrey, Scott, Jonas Moore, &c. bore witness. Boyle recommended the thigh-bone of a man hanged, as a cure for dysentery; and the royal physician Magerne prescribed the bowels of a mole cut open alive, the lungs of a suicide, &c. &c. as active remedies. Buying the small-pox in mild cases, was the origin of inoculation. Husbands' urine is still drank, to accelerate difficult labours; and Celsus recommends the warm blood of a killed gladiator, as a cure for epilepsy. Gamesters have lucky and unlucky seats, and lucky and unlucky nights.

NECHEPSUS, King of Egypt, with right royal reasoning, taught that a dragon of green jasper, worn as a gem, would improve the digestion. The ancient physicians taught, that certain musical instruments were specifics for particular diseases. To this day, in England, pigeons are cut open alive, and put reeking to dying men's feet; live snails are rubbed on warts to cure them, and a hundred other similar atrocities are committed, proving that men may be taught any thing, and that even the wisest men are great fools. The public sale of amulets is still a source of vast revenue to the catholic priesthood. Pericles wore an amulet, and Solomon cast out devils, by making the patient smell to a ring; a miracle, which the veracious Josephus saw performed in his time. The local fine weather of September, 1832, was ascribed by 999 of every 1000 in England, to the *expected* comet. The fatal colic of Poitou, in 1576, was ascribed to the new star in Cassiopeia; and, both the Plague and Fire of London were gravely ascribed to the configurations of the planets.

Among superstitions, those in medical practice are the most pernicious; and also the most disgraceful, as originating in men who *profess* extra wisdom. The venerated Vogel stated, as the result of his experience, that eating a *roasted swallow* was an antidote to angina or ossification of the heart; the same sapient Professor alledged, that *Toad powder*, produced by baking live toads in a close vessel, was a specific against gout. Our honoured Boyle taught that a drum, made of *the skin of a wolf*, was the best protection of flocks of sheep, and 50 other equal absurdities. This was universal philosophy, from 1500 to 1780, and the philosophy of many down to 1833!

The belief in attraction and in active powers of matter, *still universal*, led the doctors of the sixteenth century to prescribe powder of magnet and loadstone, as an ingredient to *draw out* bullets and arrow-heads. So late as 1770, the British government spent 25,000*l*. to get the *attraction* of a mountain measured. All the world believe that the moon affects the weather, and other lunatics; and, on this doctrine of sympathy, the lungs of a fox used to be prescribed for asthma; turmeric, because yellow, for jaundice; poppy *heads* for diseases of the cranium; the plant *eye*-bright for diseases of the eye, and three scruples of the ashes of a burnt witch, for effects of witchery.

Passing bells had their origin in the belief that the sound drove away the fiend, that might otherwise carry away the soul.

Saint Anthony saw the devil, with his head above the clouds, and his arms out-stretched, to intercept souls going to heaven.

Dr. Johnson went to Cock-lane, to verify the ghost-story, and was a believer in the Scottish second 'sight. He gave credence to most stories of ghosts, dreams, attractions, and supernaturals.

The Indians of the Amazons have priests or conjurors, who invoke the good genius *Cachimana*, and evoke the evil one *Jolokiamo*, with a large earthen trumpet, called Boloto.

The ogres of the nursery were an ugly race of Kalmucks, who united in the invasion of Europe in the fifth century, and were called *Ogurs* or *Onogurs*.

The error of witchcraft was the belief in causes not mechanical, or commensurate with the effect; and the same error in species prevails to this day, in all that is taught about causation, in our Books or Philosophy. Connection, and similitude of cause and effect, are not considered necessary. This is superstition, whether it applies to witches, or soi-disant philosophers.

Those who seek to divert themselves with the history of the most barbarous superstitions, such as would be laughed at by the lowest African tribes, have only to peruse the history of the Catholic saints.

In the black kingdom of Dahomy, besides worshipping the sun and moon, they worship a snake, which they call a fetisch; and the other black tribes worship other reptiles, which they consider the fetisch of each respective nation. No person is allowed to destroy

the fetisch; but, on the contrary, wherever one appears, it is fed and cherished with much superstition. Charms, amulets, witchcraft, and fortune-telling are also respected among all these tribes.

Gypsies, at this day, derive good living from telling fortunes by palmistry, especially to young women; and in secret, large incomes are derived in London, and all large cities, by male and female astrologers, and others, who foretell by cards, tea-leaves, &c.

Trials for WITCHCRAFT arose from Bulls of three Popes, in 1494, 1521, and 1522.

Five hundred witches were, in consequence, burnt in Geneva, in three months, in 1515.

One thousand, in the diocese of Como, in a year; and then 100 per annum for years.

Nine hundred in Lorraine, between 1580 and 1595.

An incredible number in France, about 1520. One sorceror confessed that he had 1200 associates!

One hundred and fifty-seven were burnt at Wurtzburgh only, between 1627 and 1629, old and young, clerical, learned, and ignorant.

At Lindheim, 30 were burnt in four years, of a population of 600.

In 1749, Maria Renata was burnt at Wurtzburgh; and, in two centuries, 15,700 were burnt in that city; and, throughout Germany, 100,000 altogether.

Three thousand were executed in England, under the Long Parliament.

Sir Matthew Hales burnt two in 1664; and, in 1716, Mrs. Hicks, and her daughter, aged 9, were hanged at Huntingdon. Statutes against this supposed crime were passed by Henry VIII., 1541; Elizabeth, 1562; and James I., 1602.

Barrington estimates the judicial murders for witchcraft in England, in 200 years, at 30,000.

In Scotland, thousands were burnt in about 100 years; and the last in 1722, at Dornoch; and, among the victims, were persons of the highest rank, while all orders in the state concurred. James I. even caused a whole assize to be prosecuted for an acquittal.

Northamptonshire preserved the superstition about witchcraft later than any other county. Two pretended witches were executed at Northampton, in 1705, while the *Spectator* was in course of publication in London, and five others seven years afterwards, all in the Augustine age of Ann.

Nine women of Husbands Bosworth were executed by the sapient magistrates of Leicester, in July, 1616, owing to a boy of the place having fits; and, in 1645, the Rev. Mr. Lawes, of great age, a cooper, and sixteen women, were executed at one time, at Bury Saint Edmunds.

What a terrible and disgraceful exhibition of delusion and cruelty!

The town's expenses, at a Scotch burning of two witches, is thus recorded:

	£	s.	d.
Ten loads of coals	3	6	8
A tar-barrel	0	14	0
Towe	0	6	0
Harden, to be jumps for them	3	18	0
The Executioner	9	10	4

The Scotch Solomon, James, calls witchcraft high-treason against God, and, therefore, he prohibited the usual rules of evidence.

The last burning in Scotland was in Sutherland, in 1722; the wretch who acted as judge was Capt. David Ross, of Little Dean.

Only in 1821, the laws against witches in Ireland were repealed; and, at Glarus, a servant girl was burnt so late as 1786!

In New England, in 1692, above 400 were accused, and 19 put to death; one refused to plead, and was pressed to death!

The casting of a nativity among astrologers means the drawing out a picture of the heavens at the minute of birth, in which the signs are disposed in 12 equal spaces, called houses, and the planets, &c. put into the signs. On this judgment is given, but as there is no possible or probable connection between these signs and the subject, so a pack of cards, or any other combination, answers the very same purpose.

So late as 1750, a Frenchman drew an immense audience, among whom was the sapient royal commander at Culloden and Fontenay, to see him get into a quart bottle. The bottle stood on the stage, but the Frenchman, taking the money, disappeared.

If superstition is expelled from parlours and drawing-rooms, it prevails in cottages and kitchens, and thence is transferred to nurseries. Laying ghosts in the Red Sea, was a grave clerical employment within 150 years. There is scarcely a parish in Britain without its haunted houses, or wandering ghost, even to this day. Horse-shoes, to keep out witches and evil spirits, are to be seen every where. In polite society, luck and ill-luck at cards, &c. is universally credited: seats are changed, chairs are turned, &c. &c. &c.

Dreaming, or the imperfect unregulated thoughts of disordered sleep, has, in every age, been a prolific source of superstition, and still infects the idle, weak, and ignorant, of all ranks.

CATHOLIC CHRISTENDOM.

The epoch of the Birth of Christ was first adopted by Dionysius Exignus, in 527, and in the West about 870. In the East, the Greeks reckon from the Creation, and place the Birth of Christ in 5508, according to the Septuagint. In 527 years, an uncertainty arose about the true date of birth, some fixing it in the year of Rome 751, 752, and Scaliger in 754, in Autumn.—*Moreri.*

Dodwell fixes the Death of Jesus at 38, and the Birth in 740 of Rome. Mahomet and the Arabian Christians maintained that the crucifixion was only an exposure on the cross, and that Jesus lived till the siege, as related by Josephus.

St. Clement, the earliest father, according to Epiphanius, fixes the birth of Christ on the 18th of November, in the 28th of Augustus, *i. e.* two years before the Christian era, as adopted in the sixth and seventh century.

The accusers of Jesus to Pilate, according to the Gospel of Nicodemus, were Ananias, Caiphas, Sommas, Datam, Gamaliel, Judah, and Nephthaiim, being the chiefs of the synagogue.

The name of Christians was adopted at Antioch, about the year 60.

The divinity of Christ was adopted at the Council of Nice, by 299 bishops against 18.

The first Christians were divided into Episcopoi; Presbyteroi; Diaconoi; Pistoi; Catachumens, or Learners; and Energumens, who were to be exercised.

The first council, in 325, and the three or four next, all had it for their object to oppose powerful divisions about the divinity of Christ.

Constantine assimilated the government of his new Christian church to that of his civil government. Hence the ranks and grades in the church. Patriarchs held the first place for general rule, and these were the Bishops of Rome, Antioch, Alexandria, and Constantinople. Archbishops and Bishops were appointed for local jurisdiction, and Archdeacons below them.

Arianism, so called from Arius, who, in the fourth century, denied the equality of the Trinity. It was extensively received, but condemned by the church, by which Arians were persecuted to death in all ages. The modern Unitarians, now so numerous and powerful, deny the divinity of Christ. Arians denied the Trinity, and they succeeded in converting the sons of Constantine and the chief men of the empire; but Athanasius and his party prevailed at the Council of Nice in 325, and the Arian doctrines were condemned. They ascribed Glory to the Father through the Son in the Holy Ghost. This question has since cost millions of lives. Arius was a priest of Alexandria, and a friend of Eusebius. He died in 336.

Monasteries began in the Eastern church; and the first was in Egypt, founded by Pachonius. The plan was introduced into Italy by Benedict; and into England by Augustine, in 596.

Feuds commenced in the Christian church among the Apostles, about the nature of Christ, and the admission of the gentiles. In the second century, other subjects, as the divinity, co-divinity, &c. created sharp controversies. In the third and fourth centuries these differences led to mutual proscriptions and horrible assassinations, particularly at Alexandria, where the zeal of Athanasius, in behalf of the Logos of Plato, and the Triad, or Trinity, influenced people against Arius, Eusebius, and their party, who denied the Trinity.

The Council of Trent decreed that the old Latin Vulgate should be considered authentic. After the Council, A. D. 1590, Pope Sextus V. sent forth, from the Vatican press, an edition of the Vulgate, prepared and published, under his own eye, and in some places corrected with his own hand, with an anathema against any person who should alter it, in *minima particula;* but Pope Clement VII. detected in this edition 2000 errors, and recalled all the copies; and, in A. D. 1592, published an amended edition, with another anathema against any person who should alter it. But no translations into vulgar tongues have been sanctioned by the church of Rome.

To preserve uniformity of faith, the Romish church forbids unauthorized translations of the Scriptures, without license in writing from the bishop or inquisitor. Booksellers, who sell to persons without such license, incur penalty. Nor are the inferior clergy permitted to read without the license of their superiors.

Sprinkling in baptism, instead of the original immersion, was sanctioned by the Pope in 753.

St. Augustine, Bishop of Hippo, the most celebrated of the early fathers, was so grossly ignorant and so audacious in mendacity, that, in one of his sermons, (the 33d), he solemnly asserts that he went, as a Christian bishop, into Ethiopia, with some disciples of the Lord, to teach the gospel, and, in that country, "We saw," says he, "many men and women without heads, with two great eyes in their stomachs; and, in a country more to the south, we met with a people who had but one eye, and that in their forehead." He, as well

as others of the fathers, attest miracles which they and others wrought, such as resurrections from the dead, &c. &c. Yet such men are often quoted as grave authorities. They used to justify these pious frauds by asserting that the end in view sanctified the means!

Excommunication is of Hindoo origin in the Pariah caste, adopted by the Jews, and from them by the Christian churches. The Greek and Roman priests, and even the Druids, had similar punishments in aid of their religion.

In 1170, on King John's quarrel with Pope Alexander III. his holiness put the kingdom under an interdict, which forbad the clergy to perform divine service, to baptise, confess, or bury, till John made submission. Other popes have put France, Germany, and parts of Italy under interdicts, and created great confusion.

The ancient religious celebrated astrological returns of the seasons by festivals, and these are still continued in the church, but without reference to astrology.

There have been 254 popes.

In 28 instances, between 254 and 1430, popes were chosen by double authorities, and those not in possession at Rome were called *Anti-popes.*

The Greek church wholly separated from the Roman about 1000. It denies transubstantiation, rejects images, admits pictures, and baptises by immersion.

Cardinals are properly the Council of the Pope, and constitute what is called the Conclave, or Sacred College. They assist the pope when he performs mass, and attend him in public. Their number, at different periods, has varied from 50 to 70. They consist of deacon-cardinals, priest-cardinals, and six bishop-cardinals, connected with Sees in Italy. They wear a red hat and cap, and a purple mantle.

Every Parish Priest was anciently called a Cardinal, and those of Rome were so; but, about 1100, it was limited to those of Rome and seven neighbouring bishoprics.

Abbots are heads of a monastery; and, according to rank, cardinal-abbots; bishop-abbots and mitred-abbots when holding from the pope.

Roman Catholics are called Papists, from the word *Papa* (Father), applied to the pope as their head.

Abbé, Abbot, Abbas, Abbey, &c. come from *Ab* (Father), and was adopted by the Jewish doctors. The Abbey of Mount Cassino, near Naples, founded by Benedict, in 529, was the richest ever known, and furnished no less than 10,000 saints.

The Latin translation of the New Testament was made by Jerome in 405, and sanctioned by the Pope about 200 years afterwards. Beza's ancient copy of the New Testament is supposed to have been made in the second century, or, according to Bishop Marsh, in the fifth; but it contains only the four Gospels and the Acts.

Luther stated that he neither believed the Apocalypse of John to be a book of prophecy, nor of apostolical character. It was first adopted in the Romish church by a Council at Toledo. Early Christian writers mention apocalypses of Peter, Paul, Thomas, Stephen, &c. Dionysius, who wrote in the third century, ascribes John's to one John, a Presbyter, of Ephesus; and Eusebius confirms this opinion. Other writers ascribe it to one Cerinthus, who put the name of the Apostle to it to give it currency. The Greek church does not recognise it. Michaelis, a great authority, thinks that it was received by accident by the church of Rome, rather than as the result of deliberate examination. Sir Isaac Newton wrote many commentaries on it, one of which he copied 15 times.

The Apocryphal New Testament consists of such books as were cited as genuine by the early fathers; but which were not recognized as canonical by the councils of the Romish church. The Gospel of the Infancy of Christ contains many passages which seem to have been adopted by the evangelists; and it gives a circumstantial account of juvenile miracles before Jesus began his public preaching. The Gospel of St. Mary gives the life of the holy virgin. The whole were printed in Greek at the University of Oxford, and translations have been made by various persons.

Besides the received Acts of the Apostles by St. Luke, other Acts of the Apostles were written by Abdias. There were also Acts of St. Peter, otherwise called *Periodi Petri;* Acts of St. Paul, a continuation to the end of his life; Acts of St. John the Evangelist, mentioned by Epiphanius and St. Augustin; Acts of St. Andrew, used by the Manichees, according to St. Augustin and Epiphanius; Acts of St. Thomas, used by the Manichees, according to St. Augustin; Acts of St. Philip, a book used by the Gnostics.

The Apocalypse was written in the reign of Domitian, but it was rejected from the Canon by Luther and Michaelis, and has been questioned in all ages. Calmet describes 11 or 12 other Apocalypses. That now adopted has been ascribed to John; but, in 210, it was said to be the production of one Cerinthus.

Peter was a slender, middle-sized

man, pale complexion, black eyes, speckled with red, with short curled hair. He was married, and had a son and daughter. His second epistle is doubted, and ascribed to Simeon. Acts, a Gospel, and a Book on Judgment and Revelation were ascribed to him. It is not agreed that he ever was at Rome.

St. Paul is described as having had a large forehead, bald-head, united eye-brows, an acquiline nose, fair complexion, a short stooping figure, and crooked legs.

Peter is always drawn with a key; Paul with a sword; Andrew with his cross; James with a staff and gourd; James, the younger, with a pole; John with a cup and serpent; Philip with a cross staff; Bartholomew with a knife; Thomas with a spear; Matthew with a hatchet; Simon with a saw; Jude with a club; and Matthias with a battle-axe.

The present books of the New Testament were adopted as cannnical in the Council of Laodicea, in 364. It formed the list from Matthew to Jude, for the guide of the Christian world. The book of Revelations was not in the list.

The New Testament was, it is believed, written in Greek, and this seems to be confirmed by the quotations from the Old Testament being made from the Septuagint Greek translation.

The Apocalypse was first noticed by Justin Martyr, who wrote about 270. The New Jerusalem was to be 1500 miles square, and the houses 1500 miles high. Tertullian vows it had been seen in the air, in Palestine, for 40 nights, both by Christians and Pagans. Dyonysius and Eusebius say, however, that John's Apocalypse was composed by one Cerinthus, who ascribed it to John a Divine, not the Evangelist. The early councils rejected it, but latterly it has been adopted; and Bossuet, Sir Isaac Newton, and 1000 others have written upon it, and applied it to passing events! The Millenium has therefore been expected by votaries and these believers for the last 1500 years.

Josephus, the Jewish historian, who was born in the year 37, and who wrote circumstantially the History of the Jews, in the period contemporary with the founder of the Christian religion, mentions John the Baptist very fully; and being related to Herod's wife, he gives details of the reign of Herod; but does not notice the massacre of the children. He describes, at length, the death of Zacharius, the son of Baruch, during the siege, in the year 70, to which Jesus refers, as the last crime of the Jews, in Matthew, xxiii. 35. Josephus specially describes a Jesus, the son of Ananius, who, in the streets, constantly cried "Woe, Woe to Jerusalem!" with expressions like those in the 23d and 24th chapters of Matthew, especially verse 19. It appears, too, that he was scourged till his bones were bare, and without murmuring. He then disappeared for four years, but re-appeared at the passover, before the siege in 70, when Josephus says he was killed by a stone thrown from the Roman engines.

As books in those days were scarce, and very few could read, so different histories of Jesus were used by different churches and congregations. From this cause, there were 200 versions of Mark; but, to reconcile these, a council was called to select genuine copies; and, different ones being brought together, they were laid on an altar, and the door fastened. In the morning, however, all had, by miracle, tumbled on the floor, except a few, which were adopted as the present canonical New Testament. So say the fathers.

Eusebius and others doubt the genuineness of the Epistle to the Hebrews, St. Jude, the Second of Peter, the Second and Third of John, and the Apocalypse. He rejects these, as well as the Books of the Shepherd, the Epistle of Barnabas, and the two Epistles of Clement.

It seems uncertain when Matthew's Gospel was written; since, in speaking of the Potter's Field, the writer says, it is so called *even to this day*.—*Whiston.*

Griebach asserts, that the verse 1 John, v. 7, is found only in one Greek MS. and that of 15th or 16th Century. Porson concurs, and Newton, and a cloud of others; but, on the other hand, it is asserted, by Horsley, Travis, Burgess, Nolens, and others, to be a wilful omission. Two MSS. of the 4th Century omit the verse, and it is not quoted by the fathers in the 2d and 3d Centuries, nor by Bede, or the early commentators. More ancient Latin MSS. also omit the verse; some put the 8th before it, and some put it in the margin.

Mr. Belsham, in his extensive work on Paul's Epistles, pronounces him an inaccurate reasoner, an incorrect writer, a superficial metaphysician, not better acquainted with his subjects than we are, and not to be considered as inspired, unless (a rare occurrence) he expressly asserts it.—*Quarterly Rev.* 59.

Though Adrian and the Romans extirpated every vestige of judaism and christianity, yet Helena and the priests set up mock remains; and all the sites in the gospels are shown with reliques as original realities, by which hundreds live on the grossest delusions.

In 615, Chosroes, King of Persia, de-

stroyed all that Helena had manufactured, and it was not till 1044 that the buildings, &c. were renewed; but they were repeatedly destroyed in the holy wars. About 351, the Christian writers affirm that a shining cross, two miles long, was seen here; and Jerome, Cyril, Eusebius, and other authorities of the church led Constantine to adopt it on his standards, with the motto, "In hoc signo vinces."

Voltaire calls Helena Constantine's concubine, for he married, in 292, the daughter of Maximilian, Helena being living.

Pagus, a fountain in Greek, has been corrupted into peasant in Greek; and pagans were husbandmen, who refused to go to the holy wars; while those were so called who, in country places, adhered to their old religions on the introduction of Christianity.

To adjust great doctrinal questions, and produce uniformity, two councils of bishops were held at Nice, in Asia Minor, in 325 and 781. One at Ephesus, in 390. One at Chalcedon, in 451. Four at Constantinople, in 381, 553, 680, 869. There were also five at Rome, from 1122 to 1517; two at Lyons; one at Vienna and Florence; and the last and must celebrated was at Trent, and lasted 18 years, from 1545 to 1563. Protestant divines admit the force of only six.

From the institution of bishops, after the apostolic age, they were called fathers, papas, or popes; but, in 1090, a council at Rome determined that that title should be conferred only on the bishop of Rome.

Pope's bulls are written on parchment, with a seal of gold, silver, wax, or lead, called a bull. On one side are the heads of Peter and Paul, and on the other, the name and year of the Pope. In the formula, the Pope is called "Servant of the Servants of God."

The *breviary* contains matins, lauds, &c. as a service. *Missals* are mass-books, with collects, &c. *Rituals* contain the offices of baptism, matrimony, &c.

It is a fundamental maxim of the Catholics, "that out of the Church there is no salvation, as there was none out of the ark of Noah, which, (they say), was its type."

In 1724, Benedict XIII. published a bull against clerical wigs, under pain of ten days' imprisonment.

Monachism was the result of persecution. Devotees and fanatics fled from society, and enjoyed their faith in caves and deserts. Afterwards society itself recognised the system. The first, or he who found a biographer in Jerome, was Paul, an Egyptian youth, who fled to a ruin, from the persecution of Decius, and found a cave near it with some palm-trees, and a fountain. Antony, another recluse, dreamt of him, and found him, after meeting with a satyr and a centaur. An hyæna entered, but Paul's door was shut against Antony till he explained. Afterwards, the crow which daily brought half a loaf, brought a whole one. The two lived, therefore, together, and laid the foundation of the system of monks and nuns.

Nuns were also of Egyptian origin, the name *nonnus* being of that language.

Benedict formed the first regular monastery, under rules, on the site of a temple of Apollo, in 543, under the direction of two angels and three crows. Pope Gregory the Great and St. Pietro Damiano record his life and miracles, and tell that the devil often appeared to him as a blackbird, or with his hoofs and horns; and that he wrought miracles as a habit, raised the dead, and sang psalms before he was born. His monastic rule was, in 876, declared by the Church to be inspired by the Holy Ghost, and of equal authority with the Scriptures. 200 works have been written upon it, and the last by Calmet, in two quartos. But it was unluckily burnt in 897, with sacks of the food which heaven had sent for the saint.

The Rule enumerates the four kinds of monks then in existence. The *Cœnobites*, who live under rule. The *Anachorets* or hermits. The foulest kind, *Sarabaites*, who make their fancies the law of God. And the *Gyrovagi*, who wander from place to place, and display their vices and ignorance. It appointed the seven canonical hours of service, in lauds, primes, tierces, sexts, nones, vespers, and complines. He invented chaunting, and forbad long prayers, unless divinely inspired. The director was called father, abba, or lord-abbot (dominus et abbas); and every 10 monks were under a decanus or dean. All property was common. They slept in their clothes. Cooked by turns, dined at *sexts*, noon; and on fasts, at *nones*, or 3 o'clock. A pound of bread was allowed to each per diem, with two dishes of pulse and herbs; and a third of fruit, with a small measure of wine. Their clothes were two tunics and cowls, and for travelling, breeches were lent them from the wardrobe. Charity, piety, and benevolence are suitably enforced.

Benedict's excellent rule was, however, soon departed from. Piety conferred wealth, and monasteries became the stepping-stone of ambition and in-

dolgence. Abuses increased, till they disgraced religion and its professors, and their dissolotion was reudered necessary by the very piety which had intended to support them. Their wealth also became an object for plunder.

Benedict's nine hoors were extended to the 24, and relays of monks and nuns kept op a continued service for days, years, and generations. Flaggelation and mortification was, too, rendered a substitute for purgatory. Thirty psalms, and 100 stripes between each, was atonement for a year; and the whole psalter aod 300,000 stripes was atonement for 100 years' purgatory. Dominic tasked himself at 10 psalters and 30,000 lashes per day. These follies are quoted from the History of the Church; but Protestant aothors display 100 other exampies equally monstrous. Dariog imposture, ignorance, and credulity, kept even pace with one another, and the greater the credulity the greater the merit.—*Fosbrooke's British Monachism.*

The Christian Anchorets were analogous to the Fakeers, who impose voluntary punlshments on themselves as atonement for their imaginary sins. Their extravagances were as great as those of the Fakeers. The Mahomedan Dervises are fanatics of the same absurd character. They live in caves, or, deeming these luxury, in the open air, eat roots, go naked, herd with animals, wear chains, and in various ways torture themselves, as acceptable to God. Others fast, and pray or sing withoot ceasing.

These Christian Ascetics nearly paralleled the Bonzes, or Fakeers, in personal sufferings. Their prince, one Styletes, lived 37 years on a column from 10 feet to 65 feet high, and was, in consequence, adored by his fraternity. His subjects dwelt in dens, or crawled on all-foors, and eat grass, while some were devoured by vermin. These wretches disgraced homanity, till the Saracens put them to flight. A Fakeer was iately seen who had held his hand and arm perpendicular for 40 years; others burn fire on their heads; others swiog with hooks passed through their muscles; otbers run knives through their tongues; others never sleep, night or day, &c. &c. Andrews, in his history, tells us of an English fanatic who wore an iron shirt, mixed ashes with his flour, and kept his bread some months; in winter, often passing the night at his devotions in a pond of water, rolling naked among briars, and pouring brioe into the wounds.

St. Fulgentius, who died on the 1st of January, 533, sometimes went barefoot, aod never undressed to take rest, nor eat flesh meat, but lived on polse and herbs, though, when old, he admitted the use of a little oil. After his death, Bishop Pontain was assured in a vision of Fulgentius's Immortality.

The shrines, or coffios of saints, are not only worshipped by superstitious devotees, bot often enriched by offerings of astonishing accumolated value. That of Sir Thomas à Becket was thus rendered worth a million and a half sterling before the Reformation. During the Reformation and tbe French Revolution they were generally stript.

All the Knights of Chivalry had each their peculiar saint; the guardian of some was St. Michael, of others St. George, or St. James, or St. Martin. Edward the Third, while fighting in battle, osed to call out, "Ah, St. Edward! Ah, St. George!" The Virgin, too, accompanied them all; and their constant appeals were made to "Our Lady."

Aix-la-Chapelle owes its celebrity, as a watering-place, to Charlemagne, whose horse, in hunting, stuck his foot into one of the hot springs; but this was only a revival, the baths, &c. having been destroyed by Attila. Charlemagne adopted the spot as his residence, and he died, and was buried here, as was said, in the tomb of Jolius Cæsar. It was filled with relics, as some of the virgin's hair, a link of Peter's chain, the Virgin and Jesos, painted by Luke, (hung abont his neck when he died), a MS. of the Gospels, a crucifix of the wood of the cross, the leather girdle of Jesus sealed by Constantine, a piece of the true manna, some of Stephen's bones, a piece of one of the nails of the cross, Joseph's stockings, and Jesus's blankets. With such trumpery the churches of Rome are filled, and most of the cathedrals and abbey churches in Catholic countries; while faith makes them useful by curing diseases. It has been computed that as many pieces of the cross are shown as would build a man-of-war, but tbis is no exception to their genuineoess, for the devotees believe that they have been augmented by miracle. The same bones of the same saint, shown at different places, have also been doobled or trebled by miracle, and, therefore, the more precious, and more operative in coring troe believers and worshippers.

The Legends of Saints osed to be read in Latin, as part of the service on their days, in precedence of the other service.

Clavejo, one of the Spanish ambassadors to Tamerlane, says he saw, at Constantinople, the spear with which Jesus was pierced, with the blood fresh

upon it, some hairs of his beard, with the reed, sponge, and garment, for which lots were east.

Lord Cromwell's Commissioners found, in St. Augustine's, Bristol, two flowers which bore blossoms only on Christmas Day, Jesus's coat, "our Ladie's smucke," part of the Last Supper, part of a stone, on which Jesus sat, in Bethlehem, &c. The Prior of Maden Bradley, they found, had five sons, and a daughter married.

Early travellers, friars, and persons imbued with superstition, wrote travels from the year 700 to the revival of letters. Murray, in his Asia, gives a summary of their inventions and marvels, quite as ridiculous as the history of the Romish saints.

St. Patrick lived in the fifth century, and, being made a priest by St. Martin, at Tours, he spent 60 years in converting the Irish.

St. Francis Xavier tells us he restored nine dead persons in India.

The Culdees were early Christian foundations, introduced by St. Colomba, an Irishman, who flourished in the sixth century, in the Hebrides.

Andrew is the tutelar saint of Scotland, because one Hungus, a Pictish Prince, in 790, dreamt that St. Andrew was to be his friend in a pending battle; and accordingly a St. Andrew's × appeared in the air, during the fight, and Hungus defeated Athelstan. The collar of an order of knighthood, founded on this most contemptible legend, is formed of thistles (not to be touched) and of rue, (an antidote against poison). The motto is *Nemo me impune lacesset*.

The Roman Catholics had certain walks on each side of the body of the church, which they called porticus; and in these places it was lawful for them to make bargains, merchandise, or confer on any worldly business, as likewise in the basilica, or body itself. But the quire, called chorus, or choir, was set apart only for divine service.

The French Jansenists are gloomy schismatics from the Catholics, who, like Calvin, teach the doctrine of grace, election, and reprobation; but, as the French are not of gloomy character, Jansenism is not so popular as Calvinism in England.

The Catholic ceremonies, called mysteries, were directly derived from the mysteries of Pagan worship.

Bossuet, Bourdaloue, and Massillon, were the famous pulpit orators of France, and without rivals.

There are 100 bishoprics in the Austrian monarchy.

In 1524, all Europe was alarmed by the prediction of a deluge; all built arks, &c. but it proved a very dry season.

The Jesuits' College, at Stonyhurst, was founded by the Jesuits, who fled from Liege, in 1794-5, and whose order was proscribed by the French convention. Mr. Weld gave them the house, and 100 acres of land, and they have since bought another, and rent more. They consist of superiors, missionaries, teachers, and scholars; the last of whom are from 200 to 300 in number, at 50*l*. each. Of course, their patronage converts the neighbourhood.

In 1824, the Pope beatified one Jubean, he having wrought the miracle of enabling several half-roasted fowls to escape from the spit and fly away. In the same year the wooden image of St. Nicholas, which had been invoked to cause rain in Andalusia, moved its arm, and presented a letter to the curé, addressed to St. Nicholas, and subscribed "The Eternal Father," signifying, that at present it was impossible to spare any rain for a rebel village, which had assisted Riego.—*Annual Register*, 1825.

The Christian writers record ten persecutions of the church, in 64 by Nero, 93 by Domitian, 107 by Trajan, 164 by Marcus Aurelius, 202 by Severus, 235 by Maximin, 250 by Decius, 257 by Valerian, 272 by Aurelian, and 302 by Dioclesian.

Origin, in his third book, in answer to Celsus, says that few Christians had suffered death for religion, and that merely at intervals.

The Inquisition, since its foundation, in the 14th century, has burnt at the stake above 100,000 persons of both sexes, besides destroying twice that number by imprisonment. Religious wars among Christians, for differences in opinion, on points now unintelligible, have cost the lives of above two millions in direct slaughters; and the wars to establish Christianity, and those waged against the Turks about the Holy Land, &c. have cost 50 millions of lives. The wars of Charlemagne, &c. to Christianise the Saxons, &c., and of the Spaniards to Christianise the Moors and Americans, cost, at least, 15 millions of lives.

In all cases of martyrdom, or punishment for opinions, the prosecutors and persecutors do not alledge actual mischief committed, but proceed prospectively, under an hypothesis that the opinion has a tendency to produce some alledged or imaginary mischief.

The Inquisition and the Spanish vulgar make no distinction between a Moorish Mahomedan, a Jew, and a Protestant Christian. Hence the crimes of both. In the 15th century, the books

and MSS. of each were burnt throughout Spain, and all science was confounded with the science of the hated Arabians.

Pagan priestcraft introduced among the Saxons disgraceful and superstitious trials by ordeal and combat. Their penal laws were severe and bloody, but might be averted by fixed fines. The days of the week are named after their divinities, the Sun, Moon, Tuesco, Woden, Thor, Friga, and Saturn. Easter is named from their goddess Eostre; and Christmas was their great festival Geoll. Faul, or Fola, was their dreaded enemy; and they believed in elves and fairies, sorcery and witchcraft.

When St. Alban was ordered to execution, he and a thousand men walked dry through the river; at least, so says Gildas.

The first Auto-da-Fé was at Valladolid, on May 21, 1559, before the Prince of Asturias and the king's sister. 14 were burnt, chiefly of the Vibero family, their mothers' bones being burnt with them. The second was on the 8th of October, when 13 were burnt. The next were at Seville, where 27 were burnt, and at both places the majority were females. The better spirit of Rome itself led the people, on August 18, 1559, to pull down the prison of the Inquisition, and set at liberty all the prisoners. Afterwards, in Spain, an auto-da-fé was an accompaniment of all public festivals, just like fire-works in other countries. Even in the reign of the Bourbon Philip V. there were 782 auto-da-fés, and 24 were burnt per annum.

An auto-da-fé is a gaol delivery by the Inquisition. The last was at Goa, in 1787, when 20 heretics were consigned to the flames. The Hindoos sacrifice themselves, but never one another. One hundred thousand have been sacrificed by autô-da-fés within the last 400 years.

In 1600, Giordano Bruno, a philosophical writer, who questioned some theological absurdities, was burnt at Rome

Vanini, at Toulouse, in 1629, and Leszynski, at Warsaw, in 1689, were burnt for alledged atheism.

Besides roasting Servetus at a slow fire, Calvin tried to burn Gentilis, who saved himself (by retracting) from fire, but afterwards fell beneath the axe at Berne.

The Albigenses were French Protestants of the 12th and 13th centuries, and they professed hatred of all the corruptions of the Romish church. Simon Montfort, whom we celebrate in England as a friend of liberty, commanded against them. At Bezieres, the pope's legate and he put friends and foes to the sword; at Carcasson, he stript the people of every thing; at Minerba, he burnt 150 alive; at La Vaur, he banged the governor and beheaded the chief people, drowning the governor's wife in a well, and murdering other women. His holy army then defeated the Count of Toulouse, with the loss of 17,000 men. This Simon de Montfort afterwards came to England, and established the House of Commons. But, in Germany and Switzerland, the same exterminating system prevailed against the Albigenses, where thousands were butchered; but they established the reformed religion in Switzerland.

The term Huguenots, applied to French Protestants, was a corruption of the German *Eidgenossen*, or Sworn Brethren.

Ledred, Bishop of Ossory, in 1324, availed himself of the laws of heresy, so as to persecute to the stake several persons of high rank. On being questioned by the Lord Deputy, he accused his Lordship, and directed the fury of the Church against him. The wretch was himself soon after accused of heresy, and obliged to flee the kingdom.

Hugh, bishop of Lincoln, ordered the body of Fair Rosamond to be turned out of the choir at Godstow; and Baldwin, archbishop of Canterbury, ordered the body of Owen Gwyneth, King of North Wales, to be turned out of the cathedral of Bangor, because Becket had excommunicated him for marrying his first cousin.

In 1539, one Saavedra appeared at Lisbon as legate *a latere*, from the Pope, to establish the Inquisition in Portugal. The king conceded the necessary powers, and Saavedra caused 200 to be burnt, and collected 200,000 crowns. He then departed for Spain, but being discovered to be an impostor, he was seized, but let off with a whipping and 10 years in the gallies. The Inquisition was then established in Portugal.

A work of authority, printed in 1598, by Paramo, of Madrid, relates, that then the Inquisition had, as a merit, put to death 100,000 persons. The pope's commission was to burn all Heretics, Mahomedans, and Jews.

Even in the reigns of the two last kings of Spain, 4 were burnt and 56 condemned to worse than death. The French abolished the Inquisition, but the English armies, under Wellington, restored Ferdinand, and, at the same time, this infernal tribunal.

There were, in 1830, in the Romish Conclave, the pope, four cardinal bishops, 42 cardinal priests, and 18 cardinal deacons.

The modern Catholics decry, with the Protestants, many of the preceding follies and absurdities.

PROTESTANT CHRISTENDOM.

England has a Church of its own, founded on the mixed doctrines of the Reformers. Those of Luther prevail in Germany, Prussia, Sweden, &c. Of Calvin in Switzerland, and of Arminius in Holland.

The Reformation was prepared in England, by tracts printed in Holland and Germany, and imported by a *ci-devant* monk, named Bayfield, for which he was burnt in Smithfield, in 1531. Proclamation followed proclamation, forbidding the circulation of these books of the Lutheran faction, but they were bought with avidity. The authors were Wickliffe, Luther, Zuinglius, Bucer, and Melancthon. The *Primer* was one of the most offensive; but, when the monster Henry quarrelled with the Pope, in 1535, it was printed by authority as the King's Primer, and universally circulated.

In 1537, Cranmer and Latimer printed the Bishop's book, and, soon after, they and Cromwell got out the translation of the Bible, of which 1,500 were printed, at a cost of 500*l*. In 1538, however, the tyrant forbade it to be read by women, apprentices, artificers, &c. The Bloody Bill of the six articles followed, and Cromwell and the best friends of the Reformation were its victims. Cranmer, unmoved, in 1544, drew up the litany, and afterwards the Church catechism. The liturgy was, in 1548, composed by Cranmer, Ridley, six other Bishops, and six Divines, Day, Goodrick, Skip, Holbeck, Thirlby, May, Taylor, Heins, Robertson, Redman, and Cox. 13-fourteenths differed from the Popish liturgy. It was printed by Grafton, in 1549, in folio, and sold at 2*s*. 2*d*. quires, and 3*s*. 8*d*. in calf. It was revised by Bucer and Martyr, in 1551.

St. Paul's Cross, so famous, was originally a common cross. In 1449, it was rebuilt as a pulpit cross, with stone steps, and covered galleries for persons of distinction. The last sermon from it was to King James, 1620, and in 1643 it was demolished, by order of Parliament.

Sternhold, the Psalmodist, was a groom of the Privy Chamber to Edw. VI., and he versified 37 of the Psalms, and set them to music. Hopkins, another of the Privy Chamber, did the rest.

Sir Thomas Smith, a friend of Cranmer's, was the most active person in re-establishing the Reformation, at the accession of Elizabeth.

The act of Uniformity, passed in April, 1559, was opposed in person or by proxy, by every one of the Bishops, who afterwards refused to put it in force, and were deprived, as well as 12 Deans, 12 Archdeacons, 15 Masters of Colleges, 50 Prebendaries, and 80 Rectors and Vicars.

The word Rubric is derived from Rubrica, red mineral, because the directions in Missals, &c. used to be in red characters.

Amen is Hebrew for *so be it; Hallelujah* for *praise ye the Lord;* and *Hosannah* for *O God, make speed to save us.*

The Lord's prayer is composed of phrases and sentiments then used in the service of the Jews.

Henry VIII. was, by the Pope, called *domicilium fidei Catholicæ*, for writing a book against Luther.

Since the appearance of the first translation of the New Testament, printed at Antwerp, by Tindale, in 1526, and the Bible of Coverdale, printed in 1535, there have appeared no less than 320 several translations or editions of the Bible, or parts of it, in the English language.

In January, 1538, it was enacted that every parish should provide itself with the largest edition of the Bible, and with the Paraphrase of Erasmus.

The Liturgy, as now used, was established by Parliament in 1559, being revised by Whitehead, formerly chaplain to Anne Boleyn; and by Bishops Parker, Grindal, Cox, and Pilkington, Dean May, and Secretary Smith.

In the Bishop's Bible, printed in 1558, Bishop Alley prepared the Pentateuch; Bishops Davis and Sandys, the Historical Books; and Bishop Bentham, the Psalms, &c.; Bishop Horne, the Prophets; Bishop Grindal, the Minor Prophets; and Bishops Parkhurst and Barlow, the Apocrypha; Bishop Cox, the Gospels and Acts; and Archbishop Parker the remainder.

The history of the present version of the Bible is contained in its preface.

The 47 translators were directed to alter the Bishop's Bible as little as possible. There were six companies, who took different parts, at Westminster, Cambridge, and Oxford, under the direction of the Deans of Westminster and Chester, and the Professors of Hebrew and Greek in each university. The revisions and corrections were made by two from Cambridge, Oxford, and Westminster; and the six met daily at Stationers'-hall, for 9 months.

The Apostles' creed, used by the church of England, has for its basis passages in the writings of Irenæus, A. D. 180; Tertullian, 200: and Origen, 520. The Nicene creed, in 325, is the same as the Apostles' creed.

The service of the church of Eng-

land includes three services, the morning prayer said by the Catholics at six, the litany at nine, and the communion at twelve.

The 100th Psalm was set by Luther, and the old 104th by Handel.

The Te Deum was composed by Hilary, Nicetus, or Jerome; but it has been ascribed to Ambrose and Austin, as inspired. The Apostles, or apostolic creed, was composed in the third and fourth century. The Nicene creed in 325. The Athanasian creed was written by Vigilius, about 490. The common creed, or belief, was adopted at Constantinople about 471.

For the first 800 years of the Christian era, tithes were given purely as alms. We are informed by saint Jerome, Bernard, Chrysostom, Wickliffe, Hus, and many other ancient historians, who uniformly agree, that tithes were purely voluntary. St. Augustine says, "If we (the bishops) do possess any thing privately which doth suffice us, the tithes, or alms, are not ours, but the goods of the poor, whose stewards we are; except we do challenge to ourselves a property, by some damnable usurpation." And Eusebius says, "If thou dost possess any thing more than extreme necessity doth require, and do not help the needy, thou art a thief and a robber." And in Burns' Ecclesiastical Law is the following:—"About the year 794, Offa, King of Mercia, (the most potent of all the Saxon kings of his time in this island,) made a law, whereby he gave unto the church the tithes of all his kingdom; which was done to expiate for the death of Ethelbert, King of the East Angles, whom, in the year preceding, he had caused basely to be murdered."

Clerical Benefices originated in the twelfth century. Till then, the priesthood were supported by alms and oblations at mass. The term *Benefice* was originally applied as a reward to soldiers. The mendicant friars refused the oblations.

The Tithes, &c. of England and Wales are estimated at 8,896,000*l*., or equal to about one-third of the land rental of the kingdom; for they are one-tenth of the produce and of all capital, labour, and improvements expended on increasing the produce. The clergy of all Christian Europe, with 17 times the population, receive, it is said, about 8,852,000*l*.; while the Dissenters, who are half the religions population of England, sustain their establishments with half a million. The tithes were granted by Offa, in 794, for the bishop, the church, the poor, and the resident priest, in consequence of its being announced by the clergy that infernal spirits ate all the grain in the ears, and that, to keep them off, it was necessary to devote a portion of the crops to religion and charity."

Others say, that tithes on all the land in England were granted to the clergy, in 855, by Ethelwolf, on his return from a pilgrimage to Rome.

As an equivalent for all tithe on the produce, some clerical writers claim one-third of all the rentals, leaving the poor, the church-rates, &c. to be paid out of the two-thirds and the produce.

Presbyterians maintain, that the government of Christian churches is in the ministers and presbyters, or elders.

Rectors enjoy both great and small tithes, but vicars enjoy only the small tithes, with part of the glebe. Vicarages were rectories craftily appropriated by monasteries, who sent a monk to act as their vicar, taking the great tithes for the monastery. At the reformation, when Henry the Eighth suppressed the monasteries, their incomes from great tithes were seized upon by his courtiers; and these persons and their successors, by inheritance or purchase, constitute the 7597 lay impropriators, who make a traffic of these ecclesiastical concerns.

The First-Fruits, or profits of every spiritual living, for one year, above 50*l*. and the tenths, are applied to the augmentation of poor livings, of which there were, when the plan was adopted in the reign of Anne, 5597, or one-half, averaged at 23*l*.

In the Church of England there are 755 cathedral dignitaries; 10,872 church livings, of which only 63 are in the gift of the inhabitants, 1,014 being in the crown, 3,769 in the church, 794 in the universities, 5,030 in the nobility and gentry, and 197 in various public bodies.

The Dissenting Congregations in England and Wales, in 1829, were 7,904, of which 2,827 were Wesleyan Methodists, 1,663 Independents, and 258 Presbyterian, (the two last including one-third Unitarian,) 1,047 Baptist, 396 Friends, 1,084 other Methodists, 241 of other denominations, and 389 Catholic.

A Sine-cure is when a rector pays another for doing the duty, and enjoys the surplus profits.

A Prebendary is one who enjoys a prebend, and performs duty. A Canon is not required to perform duty for his canonry.

By the recent law for building new churches, 213 churches or chapels have been built, or determined on, in 1828, at an average cost of 15.835*l*. each; and 34 are building in the Highlands, and islands of Scotland, at 1,500*l*. each.

1,409 parishes are without churches;

but as some have more than one, the 10,639 parishes supply 11,593 benefices; of these, 1,290 are in the patronage of the bishops; 1,005 of the dean and chapters; and 103 of the collegiate churches of Manchester, Ripon, Southwell, Westminster, and Windsor. Cambridge presents to 281 benefices; Oxford to 248; and the king to 1,015. The patrons of 7,597 are lay-impropriators.

The crown holds 558 *Rectories*, the bishops 592, chapters 190, Oxford 202, Cambridge 152, other colleges 39, private persons 3444, making 5177 *Rectories*.

The Crown holds 490 *Vicarages*, the bishops 709, chapters 792, Oxford 112, Cambridge 131, other colleges 107, private persons 3175, (1000 perpetual curacies,) making 5516 vicarages.

The chapelrics, not parochial, are 649, making altogether 11,342 benefices.

Benefices, in the gift of the Crown, were reservations, when the manors were granted, or acquired by lapse, or obtained at the dissolution of the monasteries. Livings belonging to universities, bishoprics, &c. were gifts of founders. Other livings, above half, have been acquired by purchase or inheritance.

There are 26 bishops in England, besides the Bishop of Soder and Man; and the Bishops of London, Durham, and Winchester take precedency. They are not allowed to vote on trials for capital offences brought before parliament.

There are Bishops of Jamaica, Barbadoes, Nova Scotia, Quebec, and Calcutta, all of recent creation.

An Archbishop may appoint 8 chaplains; a bishop, or duke, 6; a marquis, or earl, 5; a viscount, 4; a baron, 3; and a peeress 2.

Parishes are believed to have been, originally, the single estate or manor of the owner who built, or procured the church, for the convenience of his estate. This explains their odd forms and various extents.

It is believed that if tithes were abolished, their amount would be added to rents by landlords. The objection to tithes is the inequality of their amount, and their assessment on improvements. It would adjust differences, if capital employed in improvements were not titheable for seven years, like capital expended on waste lands.

There are on the average 2676 titheable acres to each parish.

The whole income is about five millions.

The churchwardens of England received, in the year 1830-1831, 663,815*l.* from church-rates, estates, fees, pews, poor-rates, &c.; and they expended 645,833*l.* in repairs, organs, bells, books, wine, clerks, sextons, visitations, and travelling.

The revennes of the English bishopricks are estimated to be 167,000*l.* or 6423*l.* each.

In 1827, 4254 curates were attached to the duties of the Church of England, and 1393 resided in glebe-houses; nearly 700 had less than 50*l.* a year; 2300 from 50*l.* to 100*l.*; 860 from 100*l.* to 160*l.*; 18 had from 200*l.* to 340*l.* 1228 of the livings were above 300*l.*; and 2496 under 300*l.* In 32 cases, the curate took the whole income.

Ecclesiastical Law is componnded of civil law, canon law, and statute law; the civil yielding to the canon, and all to the statute. *Civil Law* is ancient Roman law, and Grecian law; or jurisprudentia media, between the 12 tables and the same Roman laws, condensed by Gregory in the reign of Justinian, by Hermogenes nnder Constantine, and again nnder Theodosius. The *civil law* is comprised in the code, the digest, the institute, and the novels of Justinian. Civil law governs the courts of Admiralty, Herald's college, the Universities, partly chancery, and the Ecclesiastical courts.

Canon law is Popish law, and decrees of councils collected by Grafton, in 1149, and enlarged by Decretals, collected in 1308. It governs the clergy in church affairs, but does not bind the laity. It is subject to Statute law.

The Ecclesiastical Courts, in Doctors'-commons, consist of the Vicar General's Office, the Court of Arches, the Prerogative Court, the Faculty Office, and the Consistory Court, each of which has its president, or judge, with many subordinates. Connected with them are about 110 proctors and notaries, or ecclesiastical attorneys.

A Diocese of the Chnrch of England has its bishop, dean, arch-deacon, chancellor, precentor, sub-dean, canons, prebendaries, minor canons, vicar, or vicars, and bishop's chaplains, secretary, registrar and deputy, and from 20 to 50 dignified clergy, according to the extent and revenues. There are two English archbishoprics and 24 bishoprics; and, in Ireland, four archbishoprics, 18 bishoprics, and 33 deanеries.

The General Assembly of the Kirk of Scotland meet on the 20th of May in every year, under a high commissioner, &c.

The *Congé d'Elire* of the King to choose a Bishop originated in an arrangement of King John with the clergy, when the interdict was removed in 1214.

Bishops are called Suffragan to Archbishops. That of Canterbury is Primate of all England. He is first Peer of the Realm, and crowns the King. He has 21 dioceses, and York has four—Chester, Durham, Carlisle, and Soder and Man. Austin was the first for Canterbury, in 598; and Paulinus, of York, in 622.

The Dean and Chapter are the Bishop's Council, and their assent is permanent.

The Sides-men of Churchwardens, or properly *Synod's-men*, are empowered to assist the spiritual court.

The sum collected in all tithes in England, is about 7,500,000*l.*; and the total net revenues of the church are above 4 millions, which, if equally divided, would be nearly 400*l.* per aunum to the incumbent of every parish.

The lay-impropriators get of this income above a million and a half.

Deans and Chapters get about half a million.

There are collegiate chapters at Brecon, St. Katherine's, Manchester, Ripon, Westminster, Windsor, Wolverhampton, and Heytesbury, each with its dean; Westminster and Windsor with canons and minor canons, and the others with prebendaries.

There is an Anglican bishop of Barbadoes, Calcutta, Jamaica, Nova Scotia, and Quebec; and 6 or 7 titular bishops of the Scotch Episcopal church.

The Archbishop of Canterbury takes precedency of the Chancellor; and of York next. Other bishops precede barons.

The late Archbishops of Canterbury have been Secker, made 1758; Cornwallis, 1768; Monre, 1783; Sutton, 1805; and Howley, 1828.

The Stamp-duty on presentation to a living is 20*l.*; to other benefices, 10*l.* A bishop pays 112*l.* 10*s.* 4*d.* fees, and archbishops double.

The chaplains of goals receive, in salaries, 15,070*l.* per annum.

The revenues of the Church of Scotland are about 300,000*l.* divided among 948 livings, about 300 guineas each.

Of Ireland, from 2 to 3 millions, There are 2312 parishes in Ireland, and 1305 beneficed clergymen.

The Act of Uniformity, passed in 1682, led to the resignation of 2000 livings, by conscientious *non-conformists*; and greatly increased the body of Dissenters, who are now about one-fourth of the population, another fourth being Methodists or Puritans; another fourth members of the establishment, and another fourth without any religion.

The Whitfield Methodists are Calvinists; and the Wesley Methodists are followers of Arminius. They include a majority of the lower and uneducated classes in many counties, and support a prodigious number of preachers and teachers, whose zeal and gratitude constantly increase their votaries.

Arminianism is so called from Arminius, Divinity Professor at Leyden. It is a qualification of Calvin's doctrines about unalterable election and reprobation, and makes these points depend on moral conduct and faith, which God, however, foreknows and guides by the holy spirit through Jesus. James the First and Charles were its disciples, and its principles generally prevail in England to this day. Others are Calvinists, and leave votaries without hope or fear; while others are Unitarians, who teach the unity of God and Christian duties. Arminius died in 1609, at the age of 49.

Antinomians trust in the gospel, not in their deeds; hold crimes not to be such when committed by them; that Christ works for them, and that their own holiness and good works are of no effect.

The *Sabbatians* are Christians, who, professing to follow the example and precepts of Christ, keep the aacient divine Sabbath of Saturday, instead of the modern Romish festival of Sunday, for which this sect alledge there is not a tittle of scriptural authority. The apostles, one of their writers, observes, met on the first day of the week, "because it was the leisure day which followed Saturday, the Sabbath, like our St. Monday, and was the hebdominal return of the resurrection-day; but, that it no where appears, that even the Apostles did not also keep the true Sabbath of the fourth commandment; while their recognition of the first day proved their recognition of the seventh. Sunday was, however, a previous festival of the Heathen, the Sabeans, and the Worshippers of Baal, or the Sun; and, to this day, it is an open festival among all Roman Catholic Christians, and, was so kept in England till the age of Cromwell. Those, on the contrary, who prefer Sunday to Saturday, maintain their right to *dispense* with the fourth commandment, and say that, in their human judgment, one day is as good as another." This question has been canvassed for above 1000 years.

Methodists were the name of fanatical sects, before the civil wars.

The Agynnians were a sect who arose about 694; and alleged, from Genesis, chap. 1, that God forbade the eating of flesh. A revival of this ancient sect now flourishes in Manchester, and was established there about 1814.

The *thee* and *thou*, used by the Quakers, origihated with George Fox, who published a batteldoor for teachers

and professors, in which he adopted that mode of speech, about 1650.

The Anabaptists, of Munster, who ought to be distinguished from the modern English Baptists, taught that infant baptism was a contrivance of the devil —that the true church should be exempt from sin—that all property ought to be common—that all usury and taxes ought to be abolished—that all have a right to preach—and that civil magistrates were useless in the kingdom of Christ. Munster they called Mount Zion; and one Matthias, a baker, was declared King of Zion; and Boccold, a tailor, his general. After 15 months Munster was taken, and they were all put to death.

In 1829, the British and Foreign Bible Society had circulated, in 25 years, 11 millions of copies of the Jewish Scriptures, in 150 languages; and, in 1828, 365,424. Hence, as each book contains 30 sheets, this would make 350 millions; and they have therefore expended 660,000 reams of demy paper, duty free, at 20*s.*: and also as much more in printing and editing, or above a million sterling, in paper and printing, besides 1*s.* 6*d.* for binding, making another 825,000*l.*

The Baptist Missionaries of Serampore have translated parts of the Scriptures into thirty Oriental languages, and make a profitable use of the constant labour of ten presses.

In Nova Scotia, there are 122,000 inhabitants, of whom 93,000 are Dissenters, Methodists, or Catholics.

In Lower Canada, there are 400,000 Catholics, and only 28,000 Protestants.

£30,000 was collected in 1829, in Yorkshire only, for Bible and other such societies.

The Society for Promoting Christian Knowledge was instituted in 1699; and there is another for Scotland.

There are 69 Clergymen attached to the Chapel Royal.

The Naval and Military Bible Society was established in 1780; and the British and Foreign by John Reeves, Bible Patentee, in 1804.

There are supposed to be about two millions of Protestants in France; the remainder are professing Catholics; but scarcely one man in ten ever attends any worship. The clergy are about 30,000 in number; but the curates who perform the duties, with very small salaries, are about 25,000.

A Reformed Church began its operations in France in 1831, under the ABBE CHATEL. He has already succeeded in obtaining ten or twelve pulpits in Paris, and large cities, and is called, by his disciples, the French Luther.

The Protestants form nearly half the population of Germany.

The first church on the site of Saint Paul's was built in 610. And after being at intervals burnt down five times, the present building was begun by Wren, in 1675, and finished in 1710, at a cost of 736,000*l.* It is said, that a Temple of Diana previously stood on the spot, and, perhaps before it, a Druid Temple; since bones of Britons, vases, urns, and bones of Romans and Saxons, in stone coffins, were found in digging the foundations. It underwent a thorough repair in 1808-9.

The ordinary repairs of Westminster Abbey cost 2000*l.* per annum.

Lord Mountcashel states, that of 1,400,000 inhabitants of London, only 400,000 attend either churches or chapels. In a district of five millions of people, there were, in 1820, 2533 Established churches, and 3400 Dissenting chapels.

There is a London Missionary Society, and also a Church Missionary Society, and the Propaganda.

On Maundy Thursday, the King of England's Almoner relieves, with substantial bounty, as many recommended poor persons as correspond with the years of the King's age.

Exeter Hall, in London, has been built by the Methodist and religious community, as a place of meeting for public purposes, to avoid the alleged profaneness of assembling at a tavern.

The United States contain 13,000 clergymen, in nearly 200 sects and denominations; and their incomes average 1000 dollars, or 225*l.* each, besides the cost of churches and meeting-houses; and that of the tracts, which the sects profusely circulate, to make converts to opinions often most extravagant and fanatical.—*Cooper.*

If America abounds in crazy fanatics and narrow-minded sectarians, it is asserted by Dwight, that above a third of the population laugh with foreigners at both, as disgraceful to humanity.

There are 16 titular Protestant, and 10 Catholic, Bishops in the United States.

In the language of the five nations, the missionaries translate the words, A prayer for all conditions of men, into Yondad derearai yent daghkweanietha Siokniya godaweaghse Onwehogough.—*Quar. Review.*

Campbell, in preaching to the South Africans, understanding no language but English, was accompanied by a gradation of translators. A Dutch one to translate his English, a Corana one to translate the Dutch, and a Booshuana to translate the Corana.

Every male is an elector, who has resided twelve months in the State, or six months in his county, and the number of electors was 276,583.

Encyclopedia Americana.

Arthur Young estimated the cattle of all kinds, in England and Wales, at 2,850,000, in 1770. In 1833, they are probably half as many more, or 4½ millions. Sheep are about five times as numerous, or about 21 millions; and pigs three times, or about 13 millions. Of horses there are about 2½ millions.

London actually consumes, in oxen, calves, and sheep, per Smithfield returns, 160 millions of lbs. per annum, independently of 37ths offal. This applies to about 4-5ths, or to 1,200,000 of the gross population, and is about 133 lbs. per annum to each. But pigs, fish, poultry, and game, make up an equal weight. Butter is 50 millions lbs. and cheese and eggs as much. The flour and salt in bread is 320 millions of lbs. and a fourth more is used for other purposes, with half as much more of all other grain. Vegetables and fruits are equal to flour. And sugar, tea, coffee, oranges, foreign fruits, &c. are equal to Smithfield. Hence the consumption of London, taking the population at 1,400,000, is as under :—

Smithfield Market	160 millions
The out-parishes	27
Pigs, fish, and poultry	160
The out-parishes	27
Butter, cheese, and eggs	100
Milk 29 million quarts	58
Bread	320
Other flour	80
Other grain for man	100
Potatoes, vegetables, &c.	400
Sugar, coffee, &c.	160
Total per annum	1592 millions

Which, divided by 365 × 1·4 millions, is exactly 3 lbs. and 2 oz. per individual per day; which may be taken at 10 oz. for breakfast, 24 oz. for dinner, and 16 oz. for tea and supper. All which is independent of wine, spirits, drugs, horse-keep, &c. &c.

In the provinces, the quantity is not less per diem; but the proportions vary, and 23 millions in the United Kingdom demand an average 450 lbs. annually of various food per acre, from the 56 millions of cultivated acres, for the ordinary sustenance of the population.

The taxes and revenues of France, in 1832, were 550,004,000 francs; which, at 10*d.* is 46,584,000*l.* sterling. It was 3,207,100 francs, or 2,673,300*l.* more than 1831. The customs were 105,510,000*l.*, or 8·8 millions sterling.

West India Dock shares, which, in 1826, were 215*l.* are now but 76*l.*

In 1831, 4778 British vessels passed the Sound, and, in 1832, but 3331.

In twelve months to May, 1832, 325 vessels passed from sea to sea through the Caledonian canal.

The deaths from consumption, in London, in 1832, were 4499, cholera 3200, asthma 1050, and small-pox 771.

In the reformed parliament there are 252 county members, 400 for cities and boroughs, and 6 for universities.

A suspension-bridge of 152 feet has been erected at Leeds.

By 9309 parish returns, it appears 7225 possess a Sunday or some school in connection with the Church of England, and have 224,345 boys and 184,663 girls in daily and Sunday schools, and 163,037 boys and 167,960 girls in Sunday schools only. 2013 made no return, and are estimated to have 100,020 scholars more; that is, altogether, about 900,000. The Dissenters' and Methodist schools are probably equal.

The profits of the Bank of England, in the year ending February 29, 1832, were 1,689,176*l.* and the outgoings 339,400*l.* which includes 405 clerks, &c. &c. and 26,664*l.* to retired clerks. The ground-rents are, 40,000*l.* There are, besides, 70,875*l.* for stamp duties, and 89,274*l.* loss by bankruptcies, set against the 130,625*l.* interest on commercial bills. The nett profits were, therefore, but 1,189,627*l.*, of which 1164,235*l.* were paid in 8 per cent. to proprietors.

It appears that in January, 1824, the Bank had, coin and bullion, 14,100,000*l.*; but, in November, 1825, it was reduced to 1,300,000*l.* owing to the demands of country bankers, who had no means of meeting the run on them but in sovereigns, since 1*l.* Bank of England notes had been withdrawn! It is not true that the coin had been exported, as is often ignorantly repeated. The demand was solely from country bankers, and for the reason assigned.

The eleven branch banks in no respect interfere with country bankers. In fact, they have few or no accounts, and cost the Bank 28,508*l.* in 1831. It was one of the absurd schemes of the ignorant Liverpool administration.

The bankruptcies last year were 1591, among whom were 75 merchants, 77 grocers, 56 wine-merchants, 57 woollen-drapers, 83 victuallers, and 72 corn dealers. The expences on each were about 300*l.* or half a million ; the debts about three millions; and the dividends at 2*s.* would be 300,000*l.* or 200,000*l.* less than the expences. But if the law and lawyers permitted the majority of creditors to compound, the expences would have been under a tenth, and the dividends two millions. Hence, to enable the law to get half a million, nearly

two millions of the property of creditors is lost, and both debtors and creditors ruined.

Over and above the interest, &c. of the public debts, funded and unfunded, which in 1832 were 28,341,416*l.* the current expences were 18,881,882*l.* of which the army was 7,216,293*l.* the ordnance 1,472,944*l.* and navy 5,689,858*l.* The pensions are half a million.

In 1829-30, the charges of the East India Company, including 9,103,091*l.* for military, and 2,139,117*l.* for interest of debts, were 22,862,985*l.*; and the revenues but 22,054,416*l.*

In the three last seven years the commitments for crimes to 1817 were 56,308; to 1824, 92,848; and, to 1831, 121,518 The cause, general distress and want of employment. The capital convictions, 4952, 7688, and 9316. The total convicts, 35,259, 62,412, and 85,257. In the 21 years, 1620 were executed.

By the last population returns of Great Britain, it appears that on 16,260,381, the females exceed the males by 491,179.

The increase of population in the United States is not 8 per cent. in 10 years in the old states; but in new tracts, as Indiana, Michigan, &c. it is 200 per cent. In Connecticut, in 1790, the number was 237,946; and, in 1830, it was but 297,711. Delaware, in 1790, was 59,096, and, in 1830, was 76,739, though there have been great immigrations. Both the free and slave population have trebled since 1790, in the whole. Six of the 28 states have no slaves, and in four others there are not 100. The slavery states are the tobacco and cotton.

The Reformed Parliament will be exempt from the gross abuse of rotten boroughs, but corporate privileges must be reduced in other places, and the 50*l.* tenantry be leaseholders, before its constitution will be satisfactory. Nor will the reform be efficient, until the votes are given independently by ballot, and the elections triennial. In every 500 voters, 100 may be independent, and 100 fearless; but full 300 are timid, dependent, or under undue influence of some kind. In all elections, and in many decisions, there is no independent volition, and no convenient freedom of action, but in voting by ballot.

The City Gas-Light Company, the Bath, the Birmingham, the Bristol, the Sheffield, and the Woolwich, pay 10 per cent. to the shareholders, and 30 of 60 others, 5 per cent.; others less, or nothing.

The highest dividends on canal shares are, the Loughbro', 200 per share; Coventry, 46; Erewash, 54; Mersey and Irwell, 40; Oxford, 32; Stafford and Worcester, 34; Trent and Mersey, 37 : 10; and Stroudwater, 23: the Birmingham, 100*l.*

There are 60 serious fires per annum in London, on the average, and one alarm per day.

In London, the mean heat of January, day and night, is 36·1. In February, it rises 2 degrees. In March, 6°. In April, 6°. In May, 5°. In June, 4°; and, in July, 4°.

New London Bridge absorbed 120,000 tons of granite. The first pile was driven March 15, 1824, and it was opened August 1, 1831. The contracts were 506,000*l.*, and the whole cost treble. The clear water-way is 690 feet out of 782, the breadth. The carriage way is 35 feet, and the foot-ways nine feet each. The central arch of the five is 152 feet, and 29½ high; and there is no weir or fall, as before. Altogether, approaches, &c. it is the most superb structure of modern times.

974 miles of rail-way are in progress in the United States. One 340, and another 150 miles, all at the public expence.

Crawshay's Iron-works at Merthyr Tydvil employ 5000 persons, eight steam-engines, of 50-horse power, day and night (equal 1200 horses); eight water-wheels, of 27-horse power; and 50 furnaces, 50 feet high.

Mr. Owen has brought forward a social system of mutual moral obligation, independent of all Revelations and Churches, and has obtained large congregations. With it he connects a system of *co-operative* labour and exchange, by which one person may exchange his or her products, or receive tickets, at a conventional value, for exchange at any time. He regards the abuses of money as the root of all human misery.

Several steam-frigates have been built by the French, with four boilers, each of 60-horse power, and provided with covers for the paddles ball-proof.

The leading features in the geological structure of America are,—1st. The continuous belt of high mountains and plateaus traversing its western border, from Behring's straits to Terra del Fuego, forming the most uninterrupted extent of primitive mountains known. Their northern portion, consisting of the Rocky mountains, appears to be chiefly granitic, while, in the Cordilleras of Mexico, and the Andes of South America, the primitive strata are, for the most part, covered with immense accumulations of transition porphyries, trachytes and lavas, forming numerous volcanoes, many of which are in constant activity. 2dly.

The wide expanse of low and generally plain country, that succeeds immediately on the west to the above-mentioned zone of mountains, and through which, in both hemispheres, flow some of the most magnificent streams in the world. This region consists of immense deposits of newer rocks, over which is strewed every where, as with a mantle, the alluvial formation, or a covering of sand and gravel, with which are intermingled rolled masses of rocks. 3dly. The chain of mountains of lower elevation and inferior continuity, which forms the eastern boundary to the low country, and whose principal masses and highest points are composed of granite. 4thly. The clusters of islands occupying the seas between North and South America, which are, almost without exception, of a volcanic origin.

According to a late scientific traveller, the coasts of New Holland present, to the geological eye, many features of curiosity. There are the same ruins of former surfaces in the strata, fossil remains, fossil woods, coal strata, with all their characteristic vegetation, ironstone, fuller's-earth, &c. Mr. Wilton reports fires in the cliffs, resembling that near Lyme.

The lowest coal-bed in Yorkshire lying on the Millstone Grit, the series between the flagstone and grit is from 120 to 150 yards, and it extends from Halifax to Sheffield. It contains not only plants and fresh-water shells, but marine shells of the genera pecten and ammonites and orthocera, ostrea, and scaly fish. It is the only coal-bed so furnished, and the same strata also contain muscle bands above and below the pectens. The cause is ascribed to successive irruptions of the sea, and alternations of land and marine remains being palpable, and all in regular strata.

Mr. Scoresby announces that a magnet indicates the precise thickness of a rock, by the intensity of its action on a magnetic needle.

Mr. Mantell considers Tilgate Forest, where he finds such enormous amphibia, as the bed of the estuary of some ancient and considerable river.

The *Allemaine Zeitung* relates that, in August, a subterranean fire burnt the roots of 250 acres of forest-trees, at Magland, in Switzerland, which, on falling, were also consumed; also that flames issued from the earth near Lausanne.

Professor Buckland, of Oxford, in November, 1825, performed the barbarous experiment of enclosing 24 live toads in holes in stones, to determine how long they would live without air or food. He put 12 into 12 holes, in a block of coarse limestone, and other 12 into holes of compact limestone, and closed and luted the holes, and then buried the stones. In Dec. 1826 (13 months), be found all those in the compact stone dead, but the greater number of the others, in coarse stone, were alive. He, however, buried these again, but in a few months all were dead. He also enclosed four others in the trunk of an apple-tree, but in 12 months found all dead. Other four were enclosed in a closed basin of plaster of Paris, and in 13 months two were dead and two alive. He infers, that, if ever found in stone, they obtain food and air through some unobserved aperture.

Townson asserts, that both toads and frogs absorb water by the skin; and frogs, in a few hours, half their weight, giving it out again when in dry situations.

It being found that the metalliferous pyrites, which hitherto has been thrown away in thousands of tons, in Cornwall, contain a per centage of silver, means have been adopted to smelt and refine it; and, in consequence, above 6000 ounces of pure silver have lately been sold from this source to refiners in London.

The Durham and Northumberland coal-fields extend from South Shields to Castle Eden, 21 miles, and westward 32 miles to West Auckland. Thence to Eltringham 33 miles, and to Shields 32; in all, 594 square miles. There is another breadth of 9 miles by 27, from Shields northward, making 243 miles.

Fossil remains have been found in Mauritius and Bourbon; and, latterly, extensive discoveries of like kind have been made in New Holland, where bones of large animals are found, of unknown genera, which do not now belong to the country. There appear to be caves or accumulations of them, but they differ from European genera.

Gerard, in a late tour on the Himalayas, found fossil shells at the heighth of 17,000 feet, which appeared to have fallen down cliffs a mile higher, and in one place he found an entire bed of fossil oysters, in the external rock.

A fossil forest of several miles extent has been discovered on the Tiber, near Rome, by an English traveller.

The sands of Africa record and discriminate foot-steps, &c. as accurately and more permanently than frozen snow.

The heat of the lower strata affects water from Artesian Wells of great depth of bore, which maintains its 50° or 60° through the winter, and in this way some large mills in Wirtemburg were heated through the winter of 1830.

A new Island, called Carrao, was

thrown up by a sub-marine volcano, in July 1831, in the disturbed region of Sicily. It was preceded by local earthquakes and terrific noises, many days before. It was in lat. 37° 11' and east lon. 12° 44'. The sulphurous smell was suffocating, and the vapour and ashes ascended 1,000 feet with lightning.—On the 3d of August a British officer landed on it, and hoisted a standard. In parts it was 2 or 300 feet high, and about two miles round. Sicily had been alarmed by the earthquakes. The substance was various ashes, and no lava or pumice-stone. It has since disappeared.

For roads, taking Mountsorrel sienite at 100, the hardest material is copper slag, 234; Scotch granite and Quittle greenstone, 110; blue pebble, 105; Leeds grit stone, 115; flint, yellow, 33, and black only 11; paving-stone, 20.

It appears, unequivocally, that the luminosity of the ocean arises entirely from small insects, whose figures have recently been exactly determined by observations with the microscope.

South Carolina, a cotton-growing state, is objecting to the American Tariff, under the false notion, that if America bought more British goods, Britain would buy *still more cotton!* Malcontents, in all these cases, forget that the importer and the exporter are not the same parties, and that the importer buys to meet his own wants, and suit his own purpose, utterly regardless of the nature and extent of the transactions of exporters. Cotton merchants are not exporters; and exporters are not importers of cotton; at least, not in 19 cases in 20. It is the same in regard to all trade, and applies to much that is said about the corn trade. Merchants and nations do not barter more than the grocer and woollen-draper. If a vessel is laden outward and inward, the cargoes are sold to and bought of totally different parties, in 99 cases in 100. In cotton, too, there is at present an over importation, and a reckless manufacture.

Germany publishes per annum about 6000 new works, besides magazines and journals on all subjects. France produces about 1500 in larger editions, and about 50 journals. Great Britain about 8 or 900 books and pamphlets, and 120 magazines and journals. The book-trade in England is strangled by duties on paper, and advertisements.

Herschel and Struve saw a star through the nebulous heads of the comets in 1795 and 1828. It is now asserted that the luminous envelope of the comet of 1811 was 26,000 miles in diameter, and its interior surface 30,000 miles from the centre of the nucleus. Its solid nucleus was 2,000 miles in diameter. But the nucleuses of four other comets were only from 30 to 400 miles; if, in fact, they are more than centres of nebulous matter. The comet of 1744 was visible in the day, and ancient authors assert the same of former comets. It had six tails, each 4° wide, and 30 to 40 long. The tail of the comet of 1680 was 82 millions of miles long. That of 1689, 63 degrees; of 1744, 8 millions of miles; of 1769, 40 millions of miles; of 1811, 23 degrees. *Arago.*

Astronomers do not appear to be warranted in their *hyphothesis* about the regular orbits of comets. Two were predicted to return in 1832, but the year unusually passed without any one. Even that of 1759 was forced into the service of the hypothesis. One is announced in May, 1833, and, if one appear, will it be identical?

Mr. E. Browne asserts that chlorine gas destroys the virus of small-pox and the infection of gonorrhea.

Mr. Daniel has procured a water barometer of glass, 40 feet high and one inch in diameter, to be put in the staircase of the Royal Society. It stands in a copper cistern 18 inches by 11, and 10 deep, and is filled with distilled water. In windy weather it is in continual motion. The rise and fall precedes the mercurial by an hour.

Mr. Daniel's new pyrometer corrects all our data per Wedgwood. By it iron melts at 2·500, and others similar.

It appears that the carnivorous animals in the Zoological Garden do not thrive so well on two meals as on one meal per day.

Reichenbach has discovered two new substances in animal and vegetable tar, called paraffin and eupion. They are very incandescent, and improve incandescent substances.

Dobereiner established, by experiments on oxalic acid and metallic oxides, that the chemical influence of light is *sui generis*, and not analogous to heat, and that light causes contraction, and heat expansion. This confirms the doctrine that heating rays and visual rays are distinct, and probably owing to hydrogen and to carbon.

The Vibrio may be added to the *monas* and hydatid as the first germs of animalization.

The largest tree is the Bahobab. It is but 12 feet high, but its trunk is eight or nine yards in diameter, and its branches spread 45 yards in diameter.

A boy of five is recorded who weighed 150 lbs. and a girl of eleven 200 lbs. Bright weighed 609 lbs. Maillot 619 lbs. and Daniel Lambert 752 lbs. The "Living Skeleton," at 45, weighed 60 lbs.

PLANTS of different genera have similar qualities; thus Gray, in his admirable supplement, says there are—

Four greater carminative hot seeds, anise, carui, cummin, and fennel.

Four lesser hot seeds, bishop's weed, stone-parsley, smallage, and wild carrot.

Also four cold seeds, cucumber, gourd, melon, and water-melon.

And four lesser cold seeds, endive, lettuce, purslain, and succory.

Four sudorific woods, guaiacum, perfumed cherry, sarsaparilla, and sassafras.

Four cordial flowers, borage, bugloss, roses, and violets.

Four carminative flowers, camomile, dill, fever-few, and melilot.

Four resolvent meals, barley, bean, linseed, and rye.

Again, he gives to others a quintuple affinity, as

Five opening roots, asparagus, butcher's broom, fennel, parsley, and smallage.

Five lesser opening roots, caper, dandelion, eryngo, madder, and restharrow.

Five emollient herbs, beet, mallow, marsh mallow, French mercury, and violet.

Five capillary herbs, hart's tongue, black, white, and golden maidenhair, and spleen wort.

The five precious stones are garnet, hyacinth, sapphire, cornelian, emerald.

The *fluid ounce* of the London pharmacopœia is the 16th of a wine pint, which is equal to 433·7 grains troy.

The lb. avoirdupois of 7,000 English grains is 453·25 French grammes, and the lb. troy of 5,760 English grains is 372·96 French grammes.

The table of specific gravities, at col. 57, expresses the ounces in a cubic foot of the several bodies, water at 1,000 ounces to a cubic foot being the standard.

A table spoonful is about half a fluid ounce, or four drachms; a tea spoonful one fluid drachm; a dessert spoonful two fluid drachms. A tea cupful is three to four fluid ounces, and a wine-glass one and a half fluid ounce.

The apothecaries' ounce is equal to 1 oz. and 42·5 grs. averdupois. A drop is taken to be a grain, of which, by weight, the lb. is 5760 grs. the ounce 480 grs. the drachm 60 grs. and the scruple 20 grs. By measure, the gallon is 8 pints, 128 fluid ounces, 1024 fluid drachms, and 61,440 minims. So that the minim (marked ♏), is the 60th of the fluid drachm (f.ʒ), such as the grain or drop by weight, and 8 f. drachms are a f. oz. (f. ℥), and a 16 f. ounces are a pint. These measures are made with graduated glass vessels.

Beaumé's hydrometer floats in distilled water, for heavy fluids, or for light fluids, in water with 1 oz. of dry salt. The temp. is supposed from 56 to 60, and the sp. gr. of water 1 and brine 1·075. The scale for heavy fluids runs from 1 to 75, or from sp. gr. 1·007 to 2·087. His 13 gives sp. gr. 1·1, his 26 is 1·2, his 48 is 1·5, and his 64 is 1·8. For light fluids, his range is from 59 to 10, 50 shewing sp. gr. 0·782; 46 being 0·8 and 26 being 0·9. It makes the lightest fluid to be 0·7, the hydrocyanic acid; and the heaviest 1·85, sulp. acid. At 1·1 the wort of strong ale exactly floats a new-laid egg.

Gray, in his Supplement, gives the following, with other temperatures:

The lowest, for fermentation, 5·75; the highest 77°.

The lowest, for drying herbs, &c. 77°, and the highest 122°.

The greatest heat which the feet will bear in water 100°·5.

The usual heat at which tea and coffee is drank 110°.

Alcohol begins to boil, and water to simmer, at 178°.

Pure water boils at 212°; but, with one-fifth salt, not till 218·75; and as syrup, with sugar, not till 221°.

Burton ale yields 8·88 spirit in 100 bulk. London, 7·5. Edinburgh 6. Dorchester 5·6. London porter 4·2. Brown stout 6·8. Strong home-brewed ale 9·6.

A steam-carriage has been started in the United States, at York Town. Its first journey and return, of 41 miles, was performed at 13½ miles per hour, with 90 passengers in six cars one way, and 145 in return.

A rail-way has been constructed in France, from St. Etienne to Rouanne, and a steam-carriage has travelled on it 50 miles in 170 minutes.

A new-laid egg weighs about 2½ oz. or 20 drachms; the white 6 dr. the yolk 10 dr. and the shell 4 dr.

Bechat and Brodie teach (says Dr. Paris) that the influence of the brain is not *directly* necessary to the action of the heart, but is *immediately* necessary *only* because the muscles of respiration owe their action to the influence of the brain. But we should rather say, that the brain and nervous system owe their energy to the action of the muscles of respiration, producing galvanic excitement, and then that the brain and nervous system excite the action of the heart.

By a statement of Mr. WELLS, founded on Parliamentary documents, it appears that in January, 1833, the anticipations of the revenue in accomodation-bills, &c. amounted to 41,561,600*l*. being within 2½ millions of the entire revenues of the current year.

The regular armies of Europe are now as follow: — Austria 271,400, France 314,268, Turkey 178,000, United Kingdom 109,000, Prussia 165,000, Russia *a million*, Sweden 138,000, Holland 43,000, Denmark 38,890, Spain 46,000, Switzerland 30,000.

The British National Gallery is open gratis, from 10 to 5, every Monday, Tuesday, Wednesday, and Thursday.

The new National Gallery, on the principle of the Napoleon Museum, is in course of erection in the fine area at Charing Cross, and it cannot fail to give additional impulse to the Arts in England.

In 1779, the Empress of Russia gave, by valuation, 40,555*l.* for 232 pictures of the Houghton Gallery; among which Guido's Consultation of the Doctors was valued at 3500*l.* and a Holy Family of Vandyke and a Magdalene of Reubens, at 1600*l.* each. In 1798, the Orleans Collection was sold for 43,500*l.*; and, in 1824, the British Government bought the Angerstein Collection for 57,000*l.*, including a Sebastiano Del Piombo, which cost him 4500*l.*, 2 Claudes 6000*l.*, and Vandyke's Theodosius 1600*l.*

Sir Thomas Lawrence, up to the year 1802, had, for a three-quarters, 30 guineas, for a half-length 60 guineas, and for a whole-length 120 guineas. But, in 1808, he raised his prices to 80 guineas, and 320; and, in 1810, to 100 guineas, and 400 guineas.

Particles of blood, in congealing, range themselves on each other in flat forms like button-moulds.

Competition, as to unlimited manufactures, accommodations, and employments, has, for several years, destroyed all hopes of industry and enterprize in England, and has produced greater evils than ever arose from any registration or regulation of employments. We have, in consequence, books at 1*d.* calicoes at 3*d.* per yard, cotton and worsted stockings at 8*d.* per pair, and inside-travelling at 1*d.* and 2*d.* per mile.

In pedestrian matches, the competitors, for eight hours, have walked rather above five miles an hour.

As musket-balls rise, few take effect, and various authorities say, from 1 of 40 to 1 of 200, while not above 1 in 5 or 10 is fatal.

A classical new town and watering-place has been built within seven years by the taste and spirit of Mr. Burton, the London architect. It is called St. Leonard's, about two miles west of Hastings, and consisted, in 1832, of 120 houses of the first class, and as many of the second and third, all in luxurious taste.

Goole, in Lincolnshire, is another example of a recent new town, which in four or five years has become the outlet of the products and manufactures of the wonderful West Riding.

A cypress is still flourishing near Mexico, which arrived at maturity in 1530. It is 161 feet high.

The percussive force to drive a sixpenny nail 1¼-inch into dry deal, is four blows of 6½ lbs. falling 12 inches; or a steady pressure of 400 lbs.

2 or 300 hunters are kept at Melton Mowbray, by 40 or 50 members of the Melton club, each costing 100*l.* per annum. There are four packs of adjacent fox-hounds, of from 40 to 100 couples each. A pack sells for 1,000 guineas, and costs, with hunters, &c. from 2 to 3,000*l.* per annum.

In London, in the winter season, there are open every evening nine English theatres, patent or licensed, for music, the drama, or for interludes and petit pieces, besides Italian, French, and German performances twice each week, at the Opera House.

A company and a large establishment have been formed in the Pimlico and Chelsea road, to condense the vapour, and distill the fluid which arises from evaporation in baking the fermenting dough of bread. Eight bushels of flour made into loaves yield in the oven about 11 gallons of acetous spirituous low wines, of nauseous flavour, from which is produced one gallon of proof spirit with the flavour of Hollands. The bread, made of the best flour, is sold through London (Feb. 1833) at 7½*d.* per the 4-lbs. common loaf of the London bakers. In fact, every 10 four-lb. loaves yield half a pint of proof spirit by this ingenious process.

The loco-motive engine, with a full load on a rail-way, consumes but 4 or 5 ounces of coke per mile. From 500 to 750 passengers are often drawn by one engine.

A Chinese, quoted by Dr. Morrison, estimates the number of persons who subsist by manufacturing the sacrificing materials of idolatry in Canton province alone, as follows:—Priests of the *Budh* sect, about 4000; makers of gilt paper, *(Yuen-paou,)* 2000; makers of shrines 400; makers of candles, &c. upwards of 10,000; manufacturers of *Jos-Stick*, or odoriferous matches, upwards of 10,000. In all 26,400.

Since the Article *Shipping and Navigation* was printed, a sudden decrease in the trade of the Port of London has arisen, partly from the interrupted intercourse with Holland, and partly from a continuance of the same theoretical sophistry, and commercial misgovernment, which, since 1825, has led to the destruction of profits in trade,

and to the continually accelerated decadence of productive industry.

The inability to employ money in enterprizes of commerce, has latterly caused the stocks to advance from 84 to 88-9; and the *accommodation-bills* of the Exchequer to rise to a premium, which reduces their interest to the holders to a fraction.

The withdrawal of the currency, by which the public and private obligations of the country had been generating and accumulating for half a century, having rendered it *impossible* to liquidate them, ordinary wisdom and sound policy suggested legal compromises, or equitable adjustments; but the rapacious insolence of law, and the fatuity of cabinets and legislatures, have led to vain and cruel attempts to surmount the *impossibility;* and new rules of court, new laws, &c. &c. have, at such a time, on the contrary, been multiplied to accelerate and aggravate process.

In Michaelmas term, 1832, Tenterden's ill-judged and ill-timed law came into force. All the obstructions which the ancient laws had purposely opposed to the arbitrary powers conceded to creditors, were suddenly removed, and, by retrospect, *old* as well as *future* debts were included. The attorneys' profits are now, in 3 or 4 weeks, equal to their former profits in 3 or 6 months. Writs continue in force for 4 months, and may then be renewed for a few shillings. Appearance in or out of term must be made in 8 days, and judgment by default may be obtained in 3 weeks. Under certain forms personal service is not even necessary. The only vacation is from the end of August to the middle of October.

An affidavit of impertinent details may be submitted to, instead of bail appearing to justify; but no modification appears, either in accordance with the liberal spirit of the age, or with the peculiar public circumstances, by which nine active men in every ten have been unexpectedly rendered debtors. It was plausible, and in the abstract not unwise, to facilitate the recovery of debts from persons able to pay; but, in the actual circumstances of the country, it is difficult to say whether these alterations display more ignorance of the state of society, or greater want of sound political justice.

By a strange obliquity of legislation, the reforms, loudly and urgently demanded in the practice of law, were some years since referred to a commission of learned lawyers, with liberal salaries. As *true brothers,* of course, little has been proposed or done; and, as nothing could reasonably have been expected, no one is disappointed.

The enrolled English militia are 51,357, and the Irish 18,725, with about 2200 officers. The cost last year 351,000*l*.

The American army is 7134, and the militia 1,308,047.

The American canals are—the Welland, from Erie to Ontario; the Middlesex, near Boston, at 28 miles; the Blackstone, in Rhode Island, 45 miles; the Farmingham, in Connecticut, 65 miles; Hudson and Erie, 363 miles; Champlain and Seneca, 58 miles; Hudson and Delaware, 85 miles; Morris in Delaware, 86 miles; Ohio to Erie, 306 miles; Miami and Erie, 265 miles; Illinois and Michigan, 100 miles; Lehigh and Delaware, 47 miles; Delaware, 55 miles; the Schuylkill, 110 miles; the Union, Pennsylvania, 140 miles; Pennsylvania, with rail-roads, 320 miles; Chesapeake, 18 miles; Chesapeake and Ohio, 360 miles; the Santec, in South Carolina, 160 miles. All at the public expence.

In France, they estimate the daily consumption of bread, including that used with soups, at 2 lbs. and a quarter per person; whilst, in England, it is not quite 13 ounces.

The religion and philosophy of the Hindoos are contained in a Book called *Anbertkend;* or, the Cistern of the Waters of Life; but they have 9 schools of philosophy, ancient and modern.

There is no necessity but physical necessity, or the laws of matter, and this arises from their universality. Subordinate things as to one another, or in their mutual relations, are governed by no necessity. There is physical but not moral or relative necessity. A man in a ship is patient of its motions and physical powers, but he is *free* to stand or lie down, and to exert all volition, subject alone to the *physical* circumstances. A man on the earth resembles one in a ship.

The intense sun-like light afforded by a pea of lime, ignited by the oxygen and hydrogen blow-pipe, is so great as to create all the effects of the solar microscope. The Messrs. Gould, successors to Carey, have therefore had an exhibition of all the objects of the solar microscope, in the Strand, every evening during the present winter, and magnify objects from 6000 to 300,000 times, to the great astonishment of the public.

The ignited pea of lime has also been used in light-houses. It is only 3-8ths of an inch in diameter, yet its light is equal to 13 argand lamps, or 120 wax-candles. With a reflector, at 10 miles it casts a shadow.

The western declination of the needle was, at Paris, in 1829, 22° 12′ 5″, and the dip 67° 41′ 3″.

By eleven years' observations at the Observatory at Paris, it appears the barometer indicates no lunar tides; the rain is 18·97 inches, the cloudy days 184, partially clear 182, some rain 142, frost 58, foggy 180, snow 12, hail 9, thunder 14.

The eccentric Earl of Bridgewater's prize of 8,000*l.* for the best essay on the necessary Harmony of Nature, and the universal equality of action and re-action; is to be written for by eight persons, named by the Archbishop of Canterbury and the Bishop of London.

Mudarine, the new principle of Mudhar, possesses the singular property of dissolving in cold water, and coucreting as the heat increases.

Bees, &c. keep pace with carriages on the Liverpool rail-way, and by their flexures go through double the distance and apparently without effort.

Mammoths' teeth and bones, and those of a deer and hippopotamus were lately discovered in a flint quarry, at Luton, near Chatham.

Annual popular meetings of Amateurs of Science, called the British Association, have been held the two last years at York and Oxford. The next (in June, 1833) will be at Cambridge. Nothing can be more delightful and advantageous.

Mr. Perkins, in the past year, has added to our stock two valuable inventions:—1. a paddle wheel, which descends and rises in an oblique direction; and 2, a circulating boiler, by which the hot and cold liquid mix themselves, and produce uniform and accelerated heat.

Mr. Thomas Coggan, of Derby, has discovered a method of corroding away in metal blocks, type-heighth, all the blank parts of drawings, so to produce perfect etchings for printing, in half the time employed in producing wood-cuts.

Mr. Wilkinson, of Pall-Mall, has invented a pistol, which can be loaded ten times in a minute, and discharge every time twelve diverging horizontal balls.

The water in the precipitate pits of copper-mines, (copper and sulphuric acid) is found to harden wood so as to render it imperishable, and impenetrable to common tools.

Mr. Burnap, of New York, has invented a saw which cuts out veneers from one cylindrical block, in a continuous sheet.

A committee of the French Institute have experimentally determined that 250°·52 of heat produces steam equal to 2 atmospheres, 275°·18 of 3, 320° 36 of 6, 350° 78 of 9, 408°·92 of 18, and 439°·34 of 25.

The Admiralty Telegraph has sent a notice to Portsmouth and brought back an answer in a single minute.

The English yard is, to the French metre, exactly as 0·91438348 to 1.

As the white mulberry flourishes in most of the American States, silkworms have been propagated, and samples of raw silk of Italian quality have been sent to England.

It appears, that zinc milk-pans, or pieces of zinc put into milk, greatly increases and improves the product of cream.

Paper may be made of wood shavings, by boiling them into pulp, with an eighth of alkali.

Every degree of Fahrenheit makes a difference of 0·441 vibrations per day of a second's pendulum. 57° gave 86069·1 and 62° 86066·9.

The strength of white pine, spruce, and southern pine, are as 1, 1·111, and 1·807.

At Sheerness, the high-water spring-tides are 26·355 feet, and the neap 22·656. The low-water of each 8·74 and 11·336. Mean 17·27. At the London Docks the spring height of high-water is 28·385, and neap 25·006. The mean, 19·51. Difference of level 2·24; and, at London Bridge, by Trinity mark, 2·16, or 26 or 27 inches, in 40 miles of river.

Three persons, at the same time, have discovered a new metal in pig-iron, scoria, and natural compounds of lead. It is called Vanadium, and has some peculiar properties.

Magnesium has been obtained by decomposing chloride of magnesium by potassium. It is white, ductile, and malleable.

Decisive experiments prove that electricity is developed by contact alone of different metals, without chemical action.

Metals, and other substances in sufficient bulk, intercept magnetic action.

Mr. Merryweather, of Leeds, has combined a spirit and whiskey-lamp, with a small piece of spongy platina, so as to produce a durable light of singular utility.

Mr. Down has invented a means of purifying Coal Gas without lime-water, by passing it through a headed retort of coke or charcoal, which at the same time increases the quantity.

Mr. Palmer makes candles with spiral wicks combined with bismuth, so as not to require any snuffing.

The odour of Russia leather is from the tar of birch bark.

MM. Henry and Ten Eyck have made an electro-magnet with copper wire and cotton thread round iron, so as, with a battery 48 feet, to raise nearly a ton weight.

BIOGRAPHY.

BIOGRAPHY.

[In the following Article it has been attempted to record, in brief, only the original minds who founded or originated. Biography, in general, is filled with mere imitators, or with men noted only for the chance of birth, or necessary position in society. With this limitation it is far from complete, but it will afford data in the absence of larger works. Unfortunately of such men there is usually less known than of common-place personages who have patronized grateful Biographers; or of others who have been popular in their day, by devoting their talents to the support of vulgar predilections. The main object has been to multiply interesting facts and fundamental dates.]

AARON, high-priest of the Jews under his brother Moses. His two sons were destroyed for using other than sacred fire. His rod blossomed, in proof that his tribe of Levi was chosen for the priesthood. Nevertheless, in the absence of Moses he set up the golden calf as an object of popular worship, and died at Mount Hor, aged 123, in 1421 B. C.

There were two Shah ABBASSES, Kings of Persia, the first reigned from 1585 to 1630, and the second in the reign of Charles II.

Archbishop ABBOT was a dignitary, suspended by Charles I. for refusing to license a high-church sermon of Dr. Sibthorpe's.

ABDERAMA, a great Moorish general, killed in 732, in the bloody battle with Charles Martel, between the Cher and Loire, where it was said the Moors lost 375,000 men, and Martel but 1500, owing to an ally of Abderama deserting him in the midst of the battle.

ABELARD, was a learned professor, who debauched Heloise, and being at the point of marrying her, her uncle caused him to be castrated, on which he became a monk and she a nun. He wrote many works, died in 1142, and was buried by Heloise in her nunnery at Paraclete.

ABUBEKER, the father-in-law and successor of Mahomet as *first Caliph.* He accepted, as Caliph, but three pieces of gold as an annual salary, the maintenance of a single camel, and a black slave. Five pieces of gold and a coarse garment were all he left to his family.

ABULFEDA, Prince of Hamah, one of the few sovereigns who have filled a throne with wisdom, and distinguished himself by devotion to learning and science. He wrote a Geography, Universal History, &c. &c. still in existence, and, as productions of the thirteenth century, by one who had access to all Arabic sources, worthy of translation into English. His MSS. are at Paris.

ACHILLES, the most heroic of the Grecian generals engaged in the siege of Troy, where his history is mingled with all the absurd superstitions of Homer's times. He was killed in 1184 B. C. by the wound of an arrow in his heel, by Paris, the brother of Hector, whom he had killed, and whose body he had dragged at his chariot-wheels.

ADAMS, the second President of the United States, was born in 1735, and died at the age of 90.

There were two ADAMS, American Patriots, JOHN, born in 1731, and who died in 1826, on the 50th Anniversary of Independence; and, SAMUEL, in 1722, who died 1803. The nephew of John, named JOHN QUINCEY, was the fourth President.

ADANSON, a naturalist, died in 1795.

ADDISON, author of the Spectator, &c. died in 1719.

ADELUNG, the very learned German Philologist, died in 1806.

Pope ADRIAN IV. was Nicholas Breakspear, a native of Abbots Langley, and of very poor parentage. He converted the Norwegians, was made Cardinal, and elected Pope in 1154, as which, for four years and eight months, he tyrannized over the contemporary kings as much as any of his predecessors or successors.

ÆSOP, the Euclid of moral science, was born of parents who were slaves in Phrygia, and was sold as one at Samos to a liberal master, one Xanthus, under whom he displayed his wit and talents, and finally obtained his freedom. He was afterwards patronized by Crœsus, the rich King of Lybia, and then by the Kings of Babylon and Egypt, in which period he composed his Fables. At Delphos he ridiculed the ignorant priests and magistrates, and was in consequence thrown from a rock about 500 B. C.

ÆSCHYLUS, a tragic writer, died about 330 B. C.

AGAMEMNON, King of Argos, was the Commander of the Greeks in the siege of Troy, but he was murdered on his return by his wife and her favorite.

AGIS, a King of Lacedemon, was formally put to death by the legislature, for governing contrary to the laws.

Cornelius AGRIPPA was a learned physician, and, therefore, in the semi-barbarous sixteenth century, a reputed magician. He was a friend of Trithemius, Erasmus, and Melancton, and held various state-offices at Metz, &c. He died in 1534.

AGRIPPINA, a woman infamous in

Roman History, was the daughter of Germanicus. She was sister of Caligula, wife of Claudius, and mother of Nero, and three times married. She was put to death by Nero's order, A. D. 60.

One of the greatest wonders of female genius was Signora AGUESI, born at Milan in 1718. At nine she was familiar with Latin; at eleven she spoke Greek with fluency, and at fourteen was acquainted with several oriental languages. At fifteen she was an expert mathematician, and she published on conic sections, finite quantities, and infinitessimals. In 1750 she was appointed Professor of Mathematics and Natural Philosophy at Bologna, and after becoming a blue nun she died in 1799.

AIKIN, Dr. a tasteful writer, died 1815.

AKBAH, the Saracen conqueror of the Northern coast of Africa about 700. Another Akbah was the Great Mogul from 1556 to 1605.

AKENSIDE, poet, flourished 1750.

ALARIC, King of the Visigoths, who between 376 and 410 overran Europe, and took and sacked Rome.

ALBERTUS MAGNUS, master of the palace to Pope Alexander IV. and Bishop of Ratisbon; he had, in the 13th century, the fame of being a great magician, owing to his studious life and various knowledge. He died in 1280, aged 87.

ALCIBIADES, flourished 420 B. C.

ALCUIN, flourished 800 A. C.

There were three ALEXANDERS, Kings of Egypt, two of Epirus, three of the Jews, three of Macedon, (he who was called the Great being the third,) two of Syria, and three of Scotland, besides minor potentates, and seven popes of this name.

ALEXANDER, the son of Philip of Macedon, who, owing to the extravagance of his ambition, has been called the Great, at the age of twenty, in 336 B. C. became the leader of the armies prepared for the purpose by Philip. First destroying the liberties of Greece, he made an irruption into the too extended Persian empire, easily defeated the Asiatic myriads of Darius at the Granicus and Issus, and pursued Darius to death. After destroying the illustrious Phœnicians and Tyrians with atrocities never surpassed, he visited the Oasis of Jupiter Ammon, passing to Babylon, and thence to India, wasting life on every side for the lust of conquest. Intoxicated by success he fancied himself a god, and died either of poison or drunkenness at Babylon in 323, in the 33d year of his age. Having disturbed the world, he left it in a disorder, which led to a century of crimes and bloody revolutions. His generals seized his conquests, and destroyed his mother and children; while the only benefit was the establishment of the first Ptolemies in Egypt.

ALEXANDER, a popular Emperor of Russia, succeeded his murdered father, Paul, in 1801, and after various wars and encroachments on neighbouring states, died in 1825, aged 48.

Pope ALEXANDER VI. had four sons and a daughter, and he desired to re-establish the Roman empire in his son Cæsar Borgia. Wishing to poison some Cardinals at a feast, a bottle of poisoned wine was confided to an attendant, but by mistake he gave some to the Pope, who died in consequence, in 1503.

ALFIERI, the famous Italian dramatist, was born in 1749, and after writing about fifty tragedies and poems, he died in 1803.

ALFRED, fourth son of Ethelwolf, succeeded his brother Ethelred in 871. The Danes were then masters of the coasts, but, by various success and treaties, he acquired a durable peace from 880 to 893, when new invasions kept him employed for four years. From 897 to 900 he enjoyed peace, and died after establishing a judicial system which has lasted to this day. He promoted learning and learned men, besides writing himself many excellent works.

ALI, the first disciple of Mahomet, and his son-in-law, was assassinated, after being fourth Caliph four years and nine months. Mahomet was succeeded by Abubeker, Omar, and Othman, and the two last were also murdered. The Persians follow Ali, and the Turks Omar.

ALMAMON, the wisest of the Caliphs of Bagdad, was born in 786 and died in 835.

The Astrological King of Castile was ALPHONSUS the 10th, who succeeded in 1252, and died in 1284. He spent 400,000 crowns on the Alphonsine tables.

Under the Duke of ALVA, Spanish Viceroy in the Netherlands, 1800 were executed in a few months, and 18,000 in a few years, besides as many more by the sword, all in the cause of religion.

AMBROSE, St., was Bishop of Milan, and died in 397.

AMBROSIUS, or Emrys, was a British king, who coming from Armorica burnt Vortigern in his castle, and defeated the Saxons. Among other works he rebuilt Stonehenge, to commemorate Hengist's atrocious assassination of the British Chiefs during a feast on that spot, called by the Britons "*Gwaith Myrddin Emrys*," and by the Saxons *Stan or Stone Hengist*.

Ambrosius being poisoned by a Saxon doctor, was succeeded by his brother Uther, surnamed Pendragon, who for several years maintained wars with the Saxons, and was the father of Arthur.

AMENOPHIS is supposed to have been Memnon, Sesostris or Vexones, and to have been the Pharaoh of Moses, who enslaved the Jews, and drove them out of Egypt.

AMMON flourished 650 B. C.

AMPHICTYON flourished 1500 B. C.

AMRU, a successful leader of the Saracens, and one of the founders of the Mahomedan empire, died 663.

AMURATH I. was the founder of the power of the Turks, and reigned from 1357 till he was killed in 1390. He organized the Janizaries, and won 37 battles.

ANAXAGORAS, a Greek Philosopher, who made corporeal principles to be infinite; and those of water, fire, gold, &c. were unbegotten and incorruptible, and parts of their own eternal kinds, governed by one cause of motion and generation—intellect.

ANAXAGORAS, an Athenian, who flourished in the fifth century B. C., taught that wind was owing to rarefaction; that the rainbow was owing to reflection; that the moon is enlightened by the sun; that comets are wandering stars; that the fixed stars are beyond the sun, &c.; many of them regarded as modern discoveries. He was persecuted and banished by the priesthood.

ANAXIMANDER and THALES directed, says Simplicius, their attention to the prolific vital nature of water; Heraclitus, to fire; Anaximenes, to air; and Anaximander, to motion: owing to their different views as intelligible, sensible, or proximate, asserting different things in words, but not such as are contrary to those who are competent to judge. Aristotle observes, that some assume prior, others posterior principles; and one appeals to reason, and another to sense, with little general difference.

ANAXIMANDER, a Greek Philosopher, who flourished in the sixth century B. C., taught that infinity of matter is the original cause of all phenomena, and that all things return into it. He made the first globe, and invented the sun-dial. He observed the obliquity of the ecliptic, and taught that the sun is 28 times larger than the earth. He thought stars animated by the divinity.

Anaximander, a disciple of Thales, alleged that the infinite was the principle and element of beings, distinct from the elements and matter; and he taught that generation was the separation of contraries, through an eternal motion.

ANAXIMENES, a Greek Philosopher, who flourished in the sixth century B. C., taught the infinity of air, or ether; that its activity was the cause of all things; and that it was in reality God. From it proceed fire, water, and earth, by rarefaction and condensation.

Anaximenes, the Greek philosopher, taught that the infinite is *air*, which, divided, is fire; and condensed, wind; then a cloud; then water, earth, and minerals, from which other things are produced.

ANACREON, the Greek poet, lived in the sixth century B. C.

ANACHARSIS, a Scythian, who travelled in Greece, and invented the Potter's wheel. The fiction of his travels forms an interesting work of Barthelemi. He was put to death by his brother, for endeavouring to reform the laws.

ANELLO, Thomas, a bloody leader of a short insurrection at Naples, in 1646.

ANTHONY, the first monk, died in 251.

ANTONINUS, the best of the Roman emperors, was born in 86, and succeeded Adrian in 138. His moderation secured general peace, and though he persecuted the Christians he wrote some excellent works, and died at 75, after 23 years reign. He was succeeded by his son-in-law, Marcus Aurelius, called the philosopher, and a pattern for all kings.

ANTIGONUS, chief Captain of Alexander, got central Asia after his death, but quarrelled with Eumenes, whom he killed, and with Seleucus, whom he drove out of Syria, the other Captains of Alexander united against him, and their vast armies meeting near Ephesus, Antigonus was defeated and killed in 299, in his 80th year.

There were thirteen Syrian Kings of the name of ANTIOCHUS, between 230 B. C. and the empire of the Cæsars. The third was surnamed the Great: he began to reign 174 B. C. He joined Hannibal against the Romans, but being defeated by them lost the chief part of his dominions, and was killed by a rabble while he was plundering a temple of Belus or Baal. His son was the Epiphanes, or illustrious, of the book of Maccabees, and taking Jerusalem in 168, he slew 80,000 Jews, and sold as many for slaves, setting up the statue of Jupiter in their temple.

APELLICO, a Biblio-maniac of Athens, who bought MS., and made a vast library without reading it. He acquired fame as the rescuer of Aristotle's works, for which he gave a high

price. When Sylla took Athens he sent them to Rome.

APELLES, a Greek painter, who flourished in the age of Alexander.

APICIUS the Roman gourmand spent in a few years 807,000*l.* in luxuries of the table, and poisoned himself when he found that he had but 80,000*l.* left.

APOLLO was a native of Delos, son of Jupiter and Juno, King and Queen of Crete. When the nomenclature of the planets was formed, his name was given to the sun, and by astrology and poetry, he subsequently clothed with all the attributes of that luminary. He was contemporary with Minos, who flourished between 1200 and 1300 B. C.

APOLLONIUS Tyanus, a philosopher of Ephesus, astrologer and magician, who died at a great age, in the year 97.

AQUINAS, St. Thomas, lived from 1224 to 1274, and acquired, for his ability in solving theological and logical conundrums, the name of Angelic Doctor, angel of the schools, &c. His disciples were called *Thomists*, and his works, often printed, are in seventeen volumes folio.

ARCHIMEDES, a mathematician and mechanic of Syracuse. He was killed during an assault by the Romans, 212 B. C.

ARETINO, in 1070, invented the present musical notation, by applying to it the first syllables in the following verses—

UT qneant laxis
REsonare fibris,
MIra gestorum,
FAmuli tuorum,
SOlve pollutis
LAbus reatum.

By these he converted the old tetrachord into hexachords. He also invented lines and spaces in musical notation.

ARISTOPHANES flourished 400 B.C.

ARISTARCHUS was a learned critic of antiquity; and Zoilus a carping insolent critic. There was also a famous astronomer of the same name, who flourished about 300 B. C. and greatly improved that science.

ARISTIDES, an Athenian, was so eminent for his virtue, that in envy his enemies procured his banishment for 10 years: but he afterwards defeated the Persians at Salamis 478 B. C. and died honoured.

ARIOSTO, a famous Italian poet, died at 59, in 1533.

ARISTOTLE was a justly-celebrated philosopher of Athens, founder of the school of the Peripatetics, and tutor of Alexander the Great, who had the merit of being grateful. Of course his enlightened opinions differed from the ignorant priesthood and magistracy of Athens, but being protected by Alexander, his enemies durst not shew themselves till after the death of the king; but he was then obliged to retire from Athens. He died two years after, at the age of sixty-three, and to secure his writings they were conveyed to Ephesus, and secreted in a cellar. After 150 years they were bought by a wealthy Athenian, and then sent to Rome by Sylla. In due time they were copied and published, and to them we are indebted for clear views of the surprising perfection of many branches of knowledge among the Greeks.

ARISTOTLE and PLATO were rather commentators than inventors of new opinions, though they conferred greater perfection; and Plato defined the intellectual God; while Aristotle states, that every thing which moves must have an immoveable mover, the first principle of motion subsisting as a properly producing principle and as eternally motive.

ARISTOTLE taught the principle of virtual velocities; and, also, that time, space, and a vacuum were essential to motion, with the laws and varieties of which he was familiar. The energy of nature to fill up vacuities, he figuratively described as an abhorrence, but did not assert that there are no vacuities.

ARISTOTLE taught five rules of conceptious, or perfect reflection, as follows:—

1. To conceive of things *clearly* and *distinctly* in their own natures.

2. To conceive of things *completely* in all their parts.

3. To conceive of things *comprehensively* in all their properties and relations.

4. To conceive of things *extensively* in all their kinds.

5. To conceive of things *orderly*, or in a correct method.

Hence every perfect idea includes clearness, completeness, comprehensiveness, extent, and order.

ARISTOPHANES, a Greek comic writer and poet, who lived about 350 B. C., and pandered to the enemies of Socrates.

ARIUS, an early divine, who about 300 denied the doctrine of the Trinity and the divinity of Christ; about which he divided the church.

ARKWRIGHT, (Sir Richard,) previously a barber at Bolton, and having a mechanical genius, in 1767 constructed a machine for carding and spinning cotton; the same thing having been effected by one Hargreaves, at Blackburn, whose machinery had been destroyed by a mob of hand-carders and hand-spinners. Having made his machine near Warrington, and taken

out a patent, he removed to Nottingham to avoid mobs; but, succeeding well, his patent was impeached, and on the evidence of the Hargreaves, set aside in 1785. He had, however, set up other mills at Cromford, and dying in 1792, he left great wealth to his son, now the richest commoner in England.

ARMINIUS, a divine, flourished in 1600.

ARMINIUS, or Hermann, a German, who, in the reign of Tiberius, expelled the Romans out of Germany, but was assassinated in 55.

ARNE, an English composer of original merit, died 1778.

ARRIAN and APPIAN, two historical writers, flourished 115 A. C.

There were four ARTAXERXES, Kings of Persia. The opera is founded on the Third, called Ochus, who began his reign 364 B. C., murdering 80 of his brethren, and also Artabanes, but was finally poisoned by Bogoas, 319 B. C.

ARTHUR, a British King, who in the 6th century resisted the Saxons under Kerdric, and gained the battle of Badon, or Bath, in 520 or 30, and eleven others. He then joined the other nations under Totila, in driving in the Romans, and during his absence in Italy, his nephew Medrawd, whom he left Regent, joined the Saxons; but Arthur returning with reduced forces, met his nephew and the Saxons at Camelford, when he was mortally wounded by Medrawd, whom he killed, and only three of his brave army escaped. This happened about 550. He instituted the Round Table at Winchester, with the following motto—"Spread be my board, round as the horizon and ample as my heart, that there may be no first or last; for odious is distinction where merit is equal."

ATHENÆUS flourished 215 A. C.

ATABALIBA, King of Peru, was murdered by Pizarro at Cusco, in 1533.

ATHANASIUS, author of the creed, was a native of Alexandria. He enjoyed little authority in his life, even among Christians, and died, in 371, in exile.

ATTILA, King of the Hans (Hungary, Poland, &c.) in 441, overran Greece and Italy, and made Theodosius pay tribute. In 451 he invaded Gaul with an army of half a million, and besieged Orleans, but was defeated at Chalons with the loss of 200,000 men. He then plundered Italy a second time. He was called the scourge of God.

AUGUSTUS, nephew of Julius Cæsar, was born 62 B. C. At 20 he was made Consul and heir of Julius. He defeated Brutus and Cassius at Philippi in 41, and Mark Anthony and Cleopatra at Actium in 32. Twice he offered to restore the Supreme Power to the senate, and after being thirteen times Consul, died in 14 A. C. aged 76.

AUGUSTINE, St. was Bishop of Hippo, and died in 430.

AURENGZEBE, the most famous of the great Moguls, was born in 1618, and died in 1707. He was the third son of the Great Mogul Shah Jehan. Having murdered his elder brothers, he succeeded his father in 1659, and extended his empire over all India within the Ganges. He was a zealous Mahomedan, and sought to destroy the religion of Brahma.

AUSTIN, St. was first Archbishop of Canterbury, and died in 608, ten years after converting Ethelbert.

The two famous Arabian Philosophers were AVICENNA, born in 978, and AVERROES, born about 1130. The former was an Arabian, and educated at Bagdat—the latter was born at Cordova, but resided chiefly at Morocco. Both of them denied the possibility of a sudden creation and a particular providence.

Francis BACON, Lord Verulam, a very profound thinker for his age, and Lord Chancellor in 1619, in the reign of James I. In 1605 he dedicated his great work on the advancement of learning to James, and described him as "superior to Cæsar, Antoninus, or Hermes," for which he was raised to the highest dignities. During his ascendancy, the laws were passed for burning witches, and the great Sir Walter Raleigh was beheaded, after suffering fourteen years imprisonment in the Tower. Being accused of taking numerous bribes from suitors, some of whom he ruined for making the accusation—to save his life he confessed the whole, and was sentenced, by the House of Lords, to pay a fine of 40,000*l*. and banished London. He died in April, 1626. The sentence of the Lords was in the following terms —"That the Lord Viscount St. Albans shall undergo fine and ransom of 40,000*l*.; that he shall be imprisoned in the Tower of London during the King's pleasure; that he shall for ever be incapable of any office or employment in the State or Commonwealth; and that he shall never sit in parliament, or come within the verge of the court." His letters to Buckingham were mean and disgraceful; while in philosophy he opposed the Copernican system, believed in demonology and witchcraft, and such was his faith in astrology, that, owing to the moon being lady of his ascendant, he used to faint during an eclipse, and, as he asserted, even if he did not know of it. He translated some of the Psalms,

and the following is one of his verses, written in the age of Shakespeare.

The fishes there far voyages do make,
To divers shores their journey they do take,
There hast thou set the great Leviathan,
That makes the seas to seeth like boiling pan.

The chief design of his writings is to prove the necessity of studying nature by means of experiment, a system which had then began to prevail in Italy under Bruno and Galileo; in England under Gilbert; and in France under Gassendi.

Roger BACON was an experimental philosopher, who was born at Ilchester in 1214, to whom the world is indebted for some discoveries and the germs of others. He died in 1292, after suffering two imprisonments, and one of ten years, for "holding communion with the devil and being an Atheist."

M. BAILLY was a patriot French astronomer, born 1736, and atrociously guillotined in 1793. He was the author of a most learned history of ancient and modern astronomy; of the history of a lost people; a very eloquent writer, and a profound mathematician.

BAJAZET I. son of Amurath I. succeeded his father in 1389. He overran Asia Minor, Bulgaria, and Servia, and besieging Constantinople was attacked by a Christian army of 100,000, which he met and defeated with terrible slaughter at Nicopolis. He afterwards met Tamerlane, the Tartar, at Angora, in 1402, and after a murderous conflict of three days, in which 340,000 were slain, Bajazet was defeated and taken prisoner. He died nine months after, of an apoplexy.

Elizabeth BARTON, was the name of the holy maid of Kent, an epileptic impostor, of whom the clergy made use of to deter Henry VIII. from his quarrel with the Pope; but he ordered her to be taken up, when she confessed all, and in consequence several dignified clergy were hanged; and bishop Fisher and some others deprived and imprisoned.

BARBAROSSA was the son of a Potter, who, joining some pirates with his two brothers, soon became Admiral of a fleet, and seizing Algiers, obtained the sovereignty of that city and the adjoining country; but he was overpowered by a general confederacy two years after, and killed in battle, in 1535.

BAYLE, Peter, the celebrated writer of a great and learned Historical Dictionary, born in 1647, and died 1706.

BAYARD, Chevalier, was born in 1476, and after various romantic achievements was killed in 1524.

Cardinal BEAUFORT was son of John of Gaunt, by Catharine Swinford, sister-in-law of Chancer. He died in 1447.

Cardinal BEATON was a zealous supporter of the Romish Church while the Reformation was spreading in Scotland; and, having brought Wishart, a popular preacher, to the stake, he was assassinated in his own castle, in 1546.

Thomas à BECKET, a factious and arrogant churchman, who was killed in 1170, at Canterbury.

The Marquis BECCARIA, an eminent modern Italian writer, was born in 1755. He published on crimes and punishments, and on political economy, and died in 1793. There was also FATHER BECCARIA, an eminent natural philosopher, born in 1716. He made many discoveries in electricity and other branches of natural philosophy, and died in 1781.

BEDE, an English historian, flourished at the end of the seventh century.

BEDFORD, Duke of, a son of Henry IV. who, as Regent of France, burnt the maid of Orleans in 1431, by which atrocity the English interests were ruined in France.

BEETHOVEN, composer, died 1827.

BEHMEN, Martin, gave its name to Patagonia, in a voyage of discovery about 1480; he was afterwards treated with great distinction in Portugal; and at Nuremberg, his native city, he constructed a globe still in existence, and on which he depicted his own discoveries before the voyage of Columbus. It seems, too, that his discoveries were well known to Columbus and Magellan. He died in July 1506, at Lisbon.

BELISARIUS, commanded the victorious armies of Justinian, the Eastern emperor, from 529 to 561; but exciting jealousy, he was reduced to extreme poverty, though some say he was restored before his death, in 565.

There were two BELSHAMS, William the historian and a very amiable man, who died in 1827; and Thomas his brother, a Unitarian minister, of great ability and sound learning, who died in 1829.

There have been thirteen Popes who took the name of BENET.

BENEDICT was an Italian, born about 480, and founded his order in 543.

BERENICE, whose hair is a constellation, was sister and wife of Ptolomy Euergetes, and killed by her son 220 B. C.

BERGHMAN, a chemist, born in 1735, and died in 1784.

BERKELEY, Bishop and Philosopher, born in 1684, and died in 1753. He maintained that the existence of matter was purely ideal, and supported this by certain inferences of the mind

during vision. He thought it necessary, to expel matter from nature, to destroy scepticism and impiety.

BEROSUS, a Chaldean philosopher, who came to Greece after the death of Alexander, and wrote various works.

BERTHOLLET, a chemist, died in 1822.

BERWICK, Duke of, was son of James II. by a sister of the Duke of Marlbro', and was killed in the field, in 1734.

BERNARD was a preacher in favour of the Crusades, and a zealous stickler for the rights of the church between 1131 and 1160, when monks ruled the world.

BERTHOLD the Black, or Schwartz, whose real name was Anklitzen, was the discoverer of that mischievous compound Gun-powder, and a monk, who mingling the ingredients for a medicine in a mortar, and laying a stone upon it, it caught fire by his striking a light near it, and blowing up the stone with violence, the idea of cannon was suggested. It was first patronized by the Venetian government, and they employed the first cannon in the battle of Chioza, in 1318.

James and John BERNOULLI, commonly called *the Bernoulli*, were two very eminent mathematicians, natives of Basle, born about the middle of the seventeenth century. James died in 1705, and John in 1748. Daniel, the son of John, born in 1700, trod in the steps of his father and uncle, and died in 1782.

BICKERSTAFF, Isaac, author of Love in a Village, the Maid of the Mill, Doctor Last, Romp, Lionel and Clarissa, &c. died in 1776.

BICHAT, the French physiologist, was born in 1771, and died in 1820, having laid new foundations for the theory of animal phenomena.

BILLAUD, Varennes, the most sanguinary member of the Committee of Public Safety. He escaped to the United States, and died about 1816.

BLACK, an eminent chemist, was of Irish family, and born at Bordeaux. He received his education at Glasgow, and was elected Chemical Professor at Edinburgh in 1766. He was the promulgator of an hypothesis, that heat is a peculiar fluid, sometimes active, sometimes latent. He died in 1799.

BLACKSTONE, an English Judge, born 1723; died 1780.

Admiral BLAKE, the most heroic of English Admirals, was born at Bridgewater, in 1599. Thwarted in obtaining a fellowship at Merton College, he joined the Puritans, and was returned M. P. in 1640. In 1642 he raised a troop of Dragoons, and in 1644 surprised Taunton, of which he was made Governor, and afterwards defended it against 10,000 royalists for some months. In February, 1649, he took the command of a squadron, to act against Prince Rupert, and distinguished himself at Kinsale, the Tagus, Carthagena, and Malaga. In 1652 he commanded against Van Tromp, de Witt, and de Ruyter, and fought some signal naval battles. He afterwards attacked the Barbary States; and, in his voyage home, died in August, 1657.

Queen BOADICEA was the daughter of the King of the Iceni, (now Norfolk and Suffolk.) Her father had borrowed money of Roman usurers; one of whom appears to have been *Seneca*, the too rich philosopher. These creditors oppressed the king and his daughters, and a general insurrection was the consequence. Boadicea took Augusta, (now London) and destroyed the ninth and other legions, and above 40,000 (some say 70,000) of the Romans and their partizans. In the mean time the Romans assembled their forces, and Boadicea and the Icenians were routed with great slaughter; and she, being taken prisoner, soon after died.

BOCCACIO, an Italian writer, author of Il Decamerone, died in 1375.

BODE, author of the Celestial Atlas, containing 17,240 stars, died in 1826.

Sir Thomas BODLEY, founder of the Library at Oxford, was born in 1544, and died in 1612.

BOERHAAVE, the modern Hippocrates, was born in 1668. He reformed medicine, and expanded its philosophy more than any other modern. He died in 1738.

BOETHIUS was Prime Minister to Theodoric, King of the Goths, in 510, and preserved the Greek books during that king's conquest of Greece.

BOILEAU, a French poet, died in 1711.

There were eight sovereigns of Bohemia and Poland of the name of BOLESLAUS, in the tenth, eleventh, and twelfth centuries.

Lord BOLINGBROKE was born in 1672, and, in 1704, became Secretary at War, and in 1710 was Secretary of State. Being a suspected jacobite he lived abroad till 1723, and afterwards at Battersea, in association with Pope, and the Literati, till he died, in 1751.

St. BONIFACE was a native of Crediton, who, preaching his religion in Freizeland, was killed, with 60 of his followers, in 753.

There have been nine popes of the name of BONIFACE. The 8th, elected in 1294, dictated to all the Kings in Europe, and in 1301 he placed France under an interdict. But, being seized

by the French party of the Ghibelins, he died of a phrensy in 1303. He instituted the Jubilee of 50 years.

The bloody bishop BONNER, nnder Mary, was deprived and imprisoned, by Elizabeth, till his death, ten years after.

BOSSUET, Bishop of Meaux, an eloquent French preacher, died in 1704.

BOSCOVISH, commonly called father, becanse he was of the order of Jesuits, was an eminent mathematician, and the author of some philosophical hypotheses in the last century. He died in 1787.

The hononrable Robert BOYLE was a distinguished theological writer, and philosophical experimentalist, who flonrished in the 17th century. To his influence, while residing at Oxford, the world are indebted for the germ of the Royal Society, of which in London he was a member. He was a snccessful experimenter with the air-pump, then recently invented, but his writings are mixed with gross superstitions. He gave credit to Greatorex the stroker, and even to the pretentions of Alchemy. His contemporaries in the Royal Society were such men as Aubrey, Ashmole, Moore, and Glanvile, who were devoted to astrology and divination. He died in 1691, aged 65.

Joseph BRAMAH, the engineer, was born in 1749, and died in 1814. He took ont twenty patents for most ingenious, and some of them memorable inventions.

BRADSHAW, a native of Cheshire, and president of the court which condemned Charles I. died in November, 1659.

Tycho BRAHE was a Danish gentleman, born in 1546, who devoted himself to astronomy, and was the preceptor of Kepler. He imagined a system in contrariety to that of Copernicus, in which he placed the earth in the centre, the moon next the earth, with the snn at a distance, making Mercnry and Venus the sun's two satellites.

BRENNUS and BELINUS, two British Princes, who, in 365 B. C. led armies of Britons, Gauls, &c. against Rome, and, defeating the Romans, sacked the city; and afterwards in Greece took Delphos. The Bards and Druids, as well as Geoffrey of Monmouth, record these achievements, and Plutarch, chap. VII. book 3, speaks distinctly of it, while others say they came from the extreme west. Billingsgate is said to be called after this Belin, and his name occurs in Nennius.

There were three BREUGHELS, painters, the Droll, the Hellish, and the Velvet, from their subjects and styles. The two last died in 1642.

BRIGGS, Henry, the inventor and calculator of the Logarithms in general use, died in 1630.

BRISSOT, a philosophical politician, sacrificed by the Robespierrian party, October, 1793, with many friends.

BROOKE, Henry, a polite writer, of superior genius, died in 1783.

Mrs. BROOKE, a woman of superior talents, was condnctress of the Opera House, and wrote Rosina, and other dramas. She died in Canada, about 1790.

BROWNE, Sir Thomas, anthor of a work on Vulgar Errors, but was himself, in 1664, witness in support of a trial for witchcraft at Bury, before Sir Matthew Hale, by whom two victims were in conseqnence burnt. He died in 1682.

BRUTUS, a Trojan Prince, who, after the burning of Troy, collected the Trojans, and established colonies first on the Loire, and then landing at Totness, established that race of princes from whom Henry VII, and the present Royal Family of England claim descent.

Robert BRUCE, the Hero of Scotland, and successor of Wallace, as a defender of the country against the pretensions of Edward I. was crowned at Scone, March 27, 1306. His prowess, and that of Wallace, are deservedly favourite themes, and the battle of Banochburn having fixed his power, he reigned 23 years, dying at Cardross, on the 7th of June, 1329, in his 55th year.

BRUCE, the African traveller, was born in Scotland in 1730, and educated at Harrow. He was at first a wine-merchant, but having studied Arabic and Coptic, he was appointed Consul at Algiers, and, nnder the sanction of the Dey, he performed his travels in Asia and Africa, and visited Abyssinia and the sources of the Nile.

BRUNO, the founder of the Carthnsians, died in 1101.

The Guelphs are descended from BRUNO, brother of Wittikind, King of the Saxons, who in 785 swore allegiance to Charlemagne, and in time they became Earls of Aithop and Dukes of Bavaria.

There were two famous BRUTUS's: one Lucius Junius, the grandson of Tarqnin the Proud, whose son having violated Lucretia, Brutus roused the people to expel the family, and was himself made Consul, in the year 500 B. C. The adherents of the Royal Family conspired against the change, and among them were Titus and Tiberius, the two sons of Brutus, who refusing to protect them, they

were beheaded while he sat as Consul. He was afterwards killed in a battle with the Tarquins by one of the King's sons. The other Brutus was Marcus Junius, who was believed to be a natural son of Cæsar, by the sister of Cato; he took part with Pompey, but was forgiven by Cæsar, and promoted to a government. He was afterwards made first Prætor, but he joined the conspirators in killing Cæsar.

Jacob BRYANT, a learned expounder of ancient mythology, and a very able archæologist, was born in 1715, and died in 1804.

George BUCHANAN, a Scottish man of letters, was born in 1506, appointed tutor to James the 6th in 1565, and died in 1582.

John BUCKHOLD, a butcher of Leyden, was the fanatic leader of the Anabaptists, who, in 1533, committed such atrocities in Munster, announcing the millenium!

BUFFON, the very distinguished modern philosopher, was born in 1707. His first study, like that of all successful scholars, was mathematics, and having an income equal to 12,000*l.* a year, he was enabled to indulge his passion for learning. In 1749, he published the first volume of his famous Natural History. He died in 1788.

Sir Thomas BULLEN, was a statesman and ambassador of talent for Henry the Eighth, and created Earl of Wiltshire. His daughter Ann married Henry the Eighth in 1532, bore Elizabeth, afterwards the Queen, and was beheaded May 19, 1536, and two days after her brother George, and three of her friends; the tyrant next day marrying Jane Seymour.

John BUNYAN was an ingenious enthusiastic writer in the 17th century, and his works are exactly adapted to the class of minds who are susceptible of religious fanaticism. He was a tinker in a village near Bedford, and most cruelly treated by the intolerant government of Charles II. by being imprisoned for twelve years and a half in Bedford gaol.

The celebrated Michael Angelo, whose family name was BUONAROTTI, was born in 1474, and became the greatest sculptor, painter, and architect of his age. He built St. Peter's at Rome, and many other beautiful buildings in that city.

Edmund BURKE, who made so great a figure in English politics, and moreover was so elegant a writer, was a native of Dublin. In 1753, he came to London as an adventurer, and lived by writing for the booksellers. He afterwards edited the Annual Register, and in 1761 obtained a pension of 300*l.* a year. He then found a patron in the Marquis of Rockingham, and acted with the party of the Whigs. In 1785, he impeached Hastings, and made a great display of viruperative eloquence. At this time he wanted money, for his liberal patron died in 1782. He expected his party to subscribe for him, as they did for Fox and Grattan, but being frustrated, he exerted his pen in defending the old monarchies of Europe. For this unexpected service, he obtained a pension of 3,000*l.* per annum. He died in July 1797.

BURNS, the inimitable Scottish poet, and one of the most independent and original geniuses which that country has produced, was born near Ayr, in January 1759; poorly educated, and employed in farming labour. In July, 1795, he died of a broken constitution, and that honour is now bestowed which, alas, is too late to cheer the aspiring poet.

There were two BURNETS nearly cotemporary, and often mistaken. Thomas, the elder, was a Yorkshireman, and wrote a theory of the earth, highly ridiculous, and some other works, and died in 1715; but Gilbert was born at Edinburgh, and distinguished in the reign of Charles the Second, by his friendly connection with the partizans of liberty, attending, as a clergyman, on Lord Russel at the scaffold. He wrote a history of the Reformation, and was one of the instigators of the Prince of Orange, with whom he landed at Torbay. He was made bishop of Salisbury, and died in 1715, much respected by honest men.

Hudibras, the best picture of human life and passions ever drawn, was written by Samuel BUTLER, a native of Worcester, and educated at Cambridge. He lived neglected till his 68th year, and died in 1680.

BUXTON, Jedediah, an untaught labourer; in five hours gave the 8ths of the cubic inches in a solid 23,145,789 yards long, 5,642,732 yards broad, and 54,965 yards thick, by a means of calculation which he could never explain.

The BUXTORFS, father and son, learned Hebraists, were of Basle in the 16th century, and edited numerous works.

BYRON, Lord, a distinguished British poet, who will rank second only to Pope, in the records of British genius. He wrote much in his short career of eighteen publishing years, and died at only 39, in 1824, after a life of mental anxiety and adverse adventure; yet every stanza, true or false in sentiment, bespeaks a maturity of mind such as few writers, ancient or modern, have displayed. He was as popular as Scott, though so totally independent and so regardless of all parties, for in a

great community there are enough to patronize opposites. Concentration of thought, and strength of expression, distinguish him from all other poets, and hence, like Shakespeare, he is a writer for all times.

CABOT was a British nautical discoverer, between 1525 and 1550.

CADMUS was a Phœnician, who built Thebes, about 1520, and introduced sixteen letters to the Greeks, to which Palamedes and Simonides added four others.

CADWALADER, a British king, who, after the treachery of the Saxons, abdicated to his son, Idwal, whose descendants retained Cornwall till 750, and Wales till the age of Edward the First.

Julius CÆSAR was born 100 B. C. of the ancient Julian family. In youth he was a fop, a debauchee, a spendthrift—afterwards an intriguer. Marius was his uncle, and he married Cornelia, the daughter of Cinna, and on her death Julia, the daughter of Pompey the Great, with whom, and Crassus, he formed, in 60, a triumvirate, opposed by Cato, Cicero, and the Republicans. In 58, Pompey became pro-consul in Spain, &c. Crassus in the East, and Cæsar in Gaul and Germany. In his eight years' wars against the Gauls, Germans, Helvetians, and Britons, three millions of men were slain. On the senate ordering the disbanding of his army in 49, he marched into Italy, entered Rome, and seized the Treasury. He followed Pompey and the senate into Greece; and at Pharsalia, in 48, defeated them; and followed Pompey into Egypt, where he had been assassinated; Cato, Scipio, and others into Africa, where Cato, in despair, killed himself; and then defeated Pompey's sons in Spain. In 45, he took the title of *Imperator* and perpetual dictator; but the republicans, Brutus, Cassius, Cimber, Casca, Cato, Scipio, and sixty others, united to destroy him as a public enemy, and in five months, March, 44, he was slain in the senate-house, receiving twenty-three wounds, and being pronounced by Cassius "the worst of men." Mark Anthony, his confederate, however, availed himself of Cæsar's popularity with the soldiers and the mob, to whom Cæsar had been very prodigal, and obliged the patriotic senators to leave Rome; when civil wars ensued, which ended in Cæsar's nephew, Augustus Octavius, obtaining, in 29, the power of Cæsar, which descended in a line called Cæsars, the most odious monsters, with two or three exceptions, that ever disgraced and afflicted humanity.

John CALVIN, or CAWVIN, the Reformer, was born in 1509. He was, at first, a Romish priest, but adopting the principles of the Reformers, he fled to Basle. Here he composed and published his Institutes, in 1535. In 1540, he settled at Geneva, and his labours were wonderful. The homage paid him was so great, that one Gruet was beheaded in 1547, for speaking against him, as alleged impiety; and, in 1553, Dr. Servetus, who had written against the Trinity at Vienna, fled to Calvin, but he caused Servetus to be arrested, and he was in consequence burnt alive at Geneva, while Calvin's influence dictated every opinion of the magistracy, Bucer, Beza, and Melancthon, being said to have approved. He died Feb. 24, 1564, eleven years after the horrible death of Servetus. Calvin for several years wrote 286 sermons, and 186 lessons, and to effect this abstained from dinner for ten years. He died in consequence, at 55, afflicted with infirmities, but his followers are still numerous, especially in Great Britain, both in the Church and among dissenters.

CAMBDEN, an English antiquary, was born in 1553, and died in 1623.

CAMOENS, the Portuguese author of the Lusiad, was born in 1715, and died in 1779. His poem is an incongruous mixture of ancient and popish mythology.

CAMILLUS, M. F. a Roman Republican of the 4th century B. C. who took Veii after ten years siege, and twice repulsed Brennus and the Gauls.

CANOVA, a modern sculptor, of transcendent merit, died in 1822.

CANNING, George, a parliamentary orator, from 1796 to 1827, when he became minister, but died soon after.

There were three CARACCIS, very eminent painters, all born at Bologna, and flourishing in the same period. Annibale, the most eminent, was born in 1560, and died in 1609. His brother, Egostino, was born in 1558, and died in 1602; and Ludovico, their cousin, was born in 1555, and died in 1619. Their works, which are of the first order of merit, created a school of art, called the Bolognese.

CAROLAN, the modern Irish bard, died in 1738, in his 68th year. To his original genius we are indebted for those beautiful Irish melodies which have been harmonized by Sir John Stevenson, and provided with words by Mr. Moore. His instrument was the Irish harp.

CARADAWG, or Caractacus, was the British prince who resisted the arms of Claudius and his generals, but being betrayed, he was taken before the Emperor, and extorted the liberality of Claudius. But his whole fa-

mily were kept as hostages, by the jealous Roman tyrants.

CARNOT, a distinguished French Republican, was one of the memorable committee of Public Safety, who successfully resisted the invasions and intrigues of the Allied Sovereigns of Europe. He died in Prussia, in voluntary exile, in 1823.

CARTWRIGHT, Major, a British patriot, and one of the fathers of Parliamentary Reform, died in 1824. His brother Edmund was an original inventor of very important manufacturing and agricultural machinery, and both of them were men of rare merit and virtue.

CARDAN was an astrologer and mathematician, who died at Rome in 1576.

There were three CASSINIS, grandfather, father, and son, all eminent mathematicians and astronomers. John was born in 1625, and died in 1712; James was born in 1677, and died 1756; and Cæsar François was born 1719, and died of the small-pox in 1784. Hence, for 150 years, the name of Cassini was in high estimation throughout Europe.

There were several distinguished CASSIUSSES. The friend of Brutus, and leader of the confederacy against Cæsar, was called Longinus, and was a man of learning.

Lord CASTLEREAGH, Marquis of Londonderry, was a statesman, who flourished between 1794 and 1819, during which he filled high offices, and distinguished himself by his enmity to Napoleon, so as to have been a chief instigator of those fatal wars. In April, 1815, Napoleon, to avert the pending hostilities against all Europe, offered to Castlereagh the renewal of the commercial treaty with France of 1786, as the price of England's forbearance, an offer which was scorned, Lord C. stating that the same treaty could be got from the Bourbons. But, in 1818, Castlereagh tried the Bourbons, and Canning was sent to Paris, but in vain, and the affair, as is asserted, so wounded the pride of Castlereagh that he destroyed himself.

CASWALLAWN was the British prince who opposed Cæsar, whose forces he had attacked in Gaul, to rescue the Princess Flur, to whom he was betrothed, and who had been betrayed to Cæsar by a Prince of Gascony.

CASTOR, after whom a star in Gemini was named, was one of the Argonauts, about 1260 B. C.

CAXTON, W. was a London mercer, who in Germany learnt the new art of printing, and introduced it into England, printing about fifty or sixty books in twenty years. He died about 1492.

CATHARINE DE MEDICIS, was born at Florence, in 1589, and married Henry the Second of France, by whom she had three sons, Francis, Charles, and Alexander, all kings, and three daughters, all queens. She died in affliction in 1589.

There were two CATOS; one the Censor, the sworn enemy of Carthage; and the other his grand nephew, who killed himself at Utica, to escape from Cæsar.

CATHERINE II. late Empress of Russia, was one of the most successful women that ever sat on a throne. She was born in 1729, and in 1744 was married to the Grand Duke Peter, heir-apparent to the throne of Russia, who was a pusillanimous and debauched character. On the death of Elizabeth, in 1762, on the pretence of various personal affronts, she headed a conspiracy of nobles and military men, who contrived to get her proclaimed Empress in Petersburgh; and Peter was imprisoned as well as Prince Ivan, both of whom soon died of diseases, to which dethroned princes are very liable. She now indulged in a succession of male favourites, and to serve them carried on various wars against Turkey and Persia, acquiring some fine provinces on the Black and Caspian Seas, and by a base confederacy with Prussia and Austria, divided Poland with them. She died in November, 1796, aged 66.

The Hon. Henry CAVENDISH, a successful modern chemist, was born in 1731, and died in 1810. Scheele and Priestley having discriminated the characters of gases, Cavendish, in 1776, discriminated hydrogen or inflammable gas, and ascertained that it is the principal component of water. He also ascertained the composition of nitric acid.

The father of William CECIL, Lord Burleigh, was Master of the Robes to Henry VIII. The Protector, Somerset, made the son Secretary of State in 1549, and on the execution of Somerset, Burleigh was sent to the Tower, but released, knighted, and again made Secretary. He retired in Mary's reign, but Elizabeth made him her first Privy Councillor and Secretary of State. In 1571, he was created Baron Burleigh, and made Lord Treasurer. He was Elizabeth's minister till his death, in 1598, aged 78.

CELSUS, a Roman philosopher, flourished in 180, A. C.

CERVANTES, author of Don Quixote, and many other works, was born in 1547, and after a life of misery and care died in poverty, in 1516, the same day that Shakspeare died at Stratford.

CHARLES the Vth, Emperor of Germany, and King of Spain, was born

in 1500, and died in 1558, after a bustling and intolerant reign of 38 years.

CHARLEMAGNE, Emperor of the West, whose dominion extended from the Baltic to the Mediterranean, was born in 742, and died at Aix-la Chapelle, in 814.

CHARLES-MARTEL was Mayor of the Palace to the King of France, and in 717, usurped the government, and gained many victories, especially one over the Saracens, near Tours, in 732, by which he arrested their progress in Europe.

CHARLES the XIIth, of Sweden, became king in 1702, and lived in continual wars; but, in 1718, was killed at the siege of Frederischal.

CHAUCER, the earliest of our poets, and a man of extraordinary genius, was born in Bread Street, London, in 328. He married a sister of the mistress of John of Gaunt, who, on the death of his princess, married her, and her descendants were the subsequent royal House of Lancaster. He died in 1400.

Thomas CHATTERTON, whose short tragical story makes a figure in literary history, was born at Bristol, in 1750. His father had an employment in Redcliffe Church, and a room in its tower contained some chests bequeathed to the church in the 15th century; the contents of which were MSS. Chatterton's father, who kept the keys of the belfry, used to purloin these MSS. for various waste purposes, which exciting the attention of young Chatterton, he made himself master of their character, and transcribing some of them, published them in the Bristol papers, and finally he produced various poems written by one Rowley. All the MSS. were then destroyed, as though he were determined to leave it as a question whether, at 16 years of age, he wrote the pieces or not. This employment, however, aroused his talents, and he came to London to seek literary employment, but failing, he took poison, and was found dead in his room.

CHIRON, to whom is ascribed the Celestial Nomenclature and the Sphere, flourished about 1250.

CHILLINGWORTH, a metaphysical divine, died 1644.

CHRISTINA, daughter of Gustavus Adolphus, succeeded him at six, in 1632, and in 1654 resigned her crown, living in Italy and France, till 1689, in eccentric intercourse with artists and literati.

CHRYSOSTOM, St. died in 407.

CHUBB, Thomas, a powerful Deistical writer, died 1747.

CHURCHILL, Charles, an English Satyrist, in whose Prophecy of Famine is a just picture of the Lowland Scotch, and other pieces, strong exposures of political corruption. He died in 1764.

Colley CIBBER, was a dramatic writer of great merit, whose Hypocrite is a standing favourite. He died, aged 87, in 1757. He had a son, Theophilus, married to Dr. Arne's sister, afterwards a celebrated performer.

CICERO, Marcus Tullius, was born 105 B. C. and educated by learned Greeks. After displaying his unparalleled powers, as an advocate, he was quæster in Sicily. At 40 he became præter at Rome, and at 43 consul. At 56 he was proconsul in Cilicia, where he joined Pompey against Cæsar. At 61 he divorced his wife, and married his rich ward to pay his debts. At 64 he was proscribed by Mark Anthony, pursued, and murdered. The Oxford edition of his unrivalled works is 10 vols. 4to.

CINCINNATUS at Rome and CIMON at Athens flourished about 448.

CLARKE, Dr. S. a metaphysical divine, died 1729.

CLAUDE-LORRAIN, a famous landscape painter, died 1682.

CLARENDON, Lord, an English historian and chancellor, who died 1673.

CLEOPATRA, the last of the family of Ptolemy Lagus, was the mistress of Cæsar and Mark Anthony, on whose death she committed suicide, in her 39th year.

CLIVE, Lord, a rapacious English general, who established the sovereignty of the East India Company over Bengal, by the victory of Plassey, in 1758.

CLOVIS, the first King of France, became a Christian at the instigation of his wife in 493. He fixed the government at Paris, and died at 45, in 511.

COKE, Sir Edward, a lawyer, was born 1550. In 1592 he became attorney-general, and was ultra-malignant against Essex and Raleigh, while the Gunpowder Plot gave full scope to his forensic insolence. In 1606 he became chief of the C. P. and in 1613 of the K. B. but in 1616 was removed. In 1621 he was sent to the Tower, but afterwards framed the petition of right. He died in 1634.

Christopher COLUMBUS, the presumed discoverer of America, was born at Genoa in 1447. His family were seafaring, and he received suitable education for that employment. In 1467 he explored Iceland; for recent Portuguese discoveries, and the voyage of Martin Behmen, who really was the first discoverer of America, had directed attention to these objects. It was evident that if the world was globular, sailing westward must bring

a voyager to the East Indies. To sail to the East Indies was, therefore, Columbus' object, but in his route he fell midway upon the Babama Islands and the continent of America. Court intrigues and envy diminished his satisfaction and reward, and he died at Valladolid in Spain, partly of chagrin, in his 59th year. His family-name was Colon.

COLLINS, poet, died 1756.

COLLINS, Anthony, a metaphysical writer, died 1729.

COLLINS.—He taught that a man can do as he wills or pleases; but that he is determined by his reason and his senses, *i. e.* differently from the absolute necessity of mechanics or physics.

COLBERT, a celebrated French minister, died 1683.

CONFUCIUS, the Chinese philosopher, called Kang-too-tse by the Chinese, was born about 550 B. C. He taught the people to submit to Providence, to love their neighbours, and restrain their passions. In physics he taught, that of nothing nothing can come, that matter has existed from all eternity, that the universe is an animated system of one material substance, and one spiritual being into which every thing returns. His practical duties to render men acceptable to heaven were filial piety towards parents and ancestors, and obedience to the emperor and laws. With this wisdom he mingled faith in good and evil genii, and presiding spirits and angels with confidence in astrology and divination by casting lots. The philosopher who preceded Confucius was Las-tye; he taught a Supreme Being, and that those who seek him must reject riches and dignities, avoid care, keep silence, and be compassionate.

CONDORCET, the eminent French philosopher, was born in 1743, and to him we are indebted for the calculi of probabilities and on the truth or falsehood of decisions in mixed assemblies, making a majority of nine in 61 votes as the nearest approximation to truth. At the revolution he espoused the republican interest, and being implicated with the Brissotine party he died a fugitive, in March, 1794.

In French history there were two celebrated Princes of CONDE, one the leader of the Huguenots, who was killed at Jarnac, in 1569; the other born 1621, who, after various successful commands, died in 1686.

CONGREVE, W., a spirited English dramatist, author of Love for Love, the Mourning Bride, &c., died in 1729.

CONSTANTINE, commonly called the Great, was born in 272. His father was Constantinus, a partner in the empire with Galerius, but his mother was the daughter of an Inn-keeper of the name of Helena, who having, in her father's inn at Colchester, acquired a knowledge of Christianity, imbued her son with respect for the Christians. He became emperor at York, in 306. In the 20th year of his reign he put to death Crispus his eldest son, and his own wife Fausta, and having removed the empire to Constantinople, he died in 337, being baptized on his death-bed by Eusebius. His mother, called St. Helena, who died unmarried, built a chapel at Jerusalem, and was buried there.

Captain James COOK, the celebrated circumnavigator, was born in 1728, at Marton in Yorkshire. In August, 1768, he sailed in the Endeavour to Otaheite, to observe the transit of Venus, and surveyed New Zealand and part of New Holland. In July, 1772, he sailed with the Resolution and Adventure; visited New Zealand, the Society Islands, Middleburgh, Amsterdam, the Marquesas, the New Hebrides, and discovered Norfolk Island, returning in July, 1775. In July, 1776, he sailed on a third voyage with the Resolution and Discovery, visited New Zealand and the Friendly Islands, discovered the Sandwich Islands, and explored the western coast of North America. He then visited the Sandwich Islands again, and left them, but his ship springing a mast they returned, and a boat being stolen he went on shore to recover it, when, in an affray, he and three marines were killed, and actually eaten by the savages in the sight of the ships' crews, in February, 1779.

There were two eminent COOPERS, Lords Shaftesbury. The first a member of the long parliament, a Commander against the King, and Privy Councillor to both the Cromwells, and then a Commissioner for trying the Regicides, a Peer, and Chancellor of the Exchequer to Charles II. In 1672, he was made Lord Chancellor, but dismissed in 1673, and sent for thirteen months to the Tower. Soon after he was the author of the Habeas Corpus act, but in 1680 was tried for high-treason. —Being acquitted, he withdrew to Holland, and died in 1683. His grandson was the philosophical author of Characteristics and other works, and died in 1713.

Nicholas COPERNICUS, or in Polish *Zoppernick*, was born at Thorn, in 1473, of respectable family, and after obtaining a Doctor's degree at Cracow, he studied mathematics at Bologna, and at Rome taught mathematics and astronomy. In 1516, he obtained a Canonry from the Bishop of Ermeland,

and an Archdeaconry at Thorn. Here he compiled his system of the world, by contrasting the various opinions of the ancients with his own observations, in which he persevered for thirteen or fourteen years. Rather than be the victim of prejudices he refused to publish, but allowed a friend to precede him, but his work excited little attention. In 1543, he printed his system at Nuremberg, but died a few hours after it was finished, in May, 1543. A few years since, Thorn and Frauenberg were explored for relics of this great man. His burial-place was discovered and his bones found. Some trifling MSS. too were recovered, and the Chapter erected a monument, with a bust and suitable inscriptions.

CORREGIO, the Italian painter so much admired for the grace and delicate beauty of his productions, was born in 1494, produced his works at Parma, and died in 1534, in extreme poverty.

Ferdinando CORTES, the Spanish conqueror of Mexico, was born in 1485, and aided in the conquest of Cuba, in 1511, and in 1512 landed in Mexico with 5 or 600 ill-armed soldiers, and 10 small field-pieces; their standard being the cross. The Mexicans received them as friends, but the Spaniards soon contrived to quarrel with them, and committed the most horrible enormities, and after sacrificing Montezuma, the Mexican Emperor, and slaughtering many thousands of the Mexicans, he became master of the country, and returning to Spain, died in 1547.

CORELLI, a musician, died 1713.

CORIOLANUS flourished 500 B. C.

COSTER, Lawrence, of Haarlem, was the first practiser of printing, in 1440.

CORNEILLE, a distinguished French dramatist; born 1606, died 1684.

COULOMB, a modern experimental philosopher, died in 1806.

COWPER, William, a pleasing poet, born 1731, died in 1800.

Thomas CRANMER, to whose perseverance England is indebted for the Reformation, was born in Nottinghamshire, in 1489. He was educated at Jesus College, at Cambridge, and became D. D. in 1528. He recommended himself to Henry VIII., by writing in favour of his divorce, and after going to Rome on the subject, in 1533, the king made him Archbishop of Canterbury. Soon after he passed the sentence of divorce, and, being threatened by the Pope, favoured the Reformation. He was always thwarted by Bishop Gardner, yet he constantly retained the protection of the King, who made him one of his executors. Under Edward VI. he continued to forward the Reformation, but disgraced himself, like Calvin, by signing a warrant for burning two fanatics. In 1553, he was prosecuted by the Popish faction under Queen Mary, and after suffering various indignities was, in his 67th year, burnt at Oxford, as well as Bishops Ridley, Latimer, Hooper, and Ferrar, whose firmness and martyrdom established the Reformation.

CUDDWORTH, a metaphysical divine, born 1617, died 1688.

CREBILLON, a French dramatist, died in 1762.

CRŒSUS, the rich king of Lybia, overcome and dethroned by Cyrus about 540.

Oliver CROMWELL was born of a respectable family, at Huntingdon, in 1599. He was well educated, and settled as a gentleman farmer at St. Ives, where his signature is still to be seen in the parish-books, as the first at vestry meetings. The persecution of the Puritans conferring importance on them, he joined their sect, and was elected for Cambridge into the long Parliament. In 1642, he raised a troop of horse, and as M.P. was rapidly promoted. The victories at Marston Moor, Newbery, and Naseby, were chiefly gained by his intrepidity. In 1648, he furoibly purged the Parliament, and was very instrumental in promoting the execution of the king. In 1649, he overran Ireland. In 1650, he defeated the Scotch armies at Dunbar; and, in 1651, Prince Charles, at Worcester. In 1653, he put a violent end to the long Parliament, and six weeks afterwards was proclaimed Lord Protector of the Commonwealth. After carrying on wars against Spain and Holland, he died at Hampton Court, of the ague, in September, 1658. He was interred with great splendour in Westminster Abbey; but at the Restoration his body was hung at Tyburn, with those of Ireton and Bradshaw; and their heads were placed over the gate of Westminster Abbey, where they remained till after the revolution; but Cromwell's scull being preserved, it was exhibited about 1810, as a curiosity.

The admirable CRICHTON was born in 1551, and left St. Andrew's University highly accomplished in body and mind, in his 20th year. He was initiated in sciences, and master of 12 languages, besides excelling in all gymnastics and manly exercises. His attainments drew on him some jealousy at Mantua, and he was murdered in the street, in 1583.

CUVIER, Baron, a distinguished French naturalist, anatomist, and geologist. His comparative anatomy is a

work of the first authority, and he was enabled by this knowledge first to prove that fossil remains were of different genera and species from living animals. His labours created an epoch in scientific history. He died in 1832, at 64.

CYRUS, called the Great, was born about 600 B. C.; and having dethroned his grandfather and overcome Crœsus, took Babylon and founded the Great Persian Empire, extending from the Indus to the Euxine, and including both sides of the Red Sea. After shedding oceans of blood in his conquests, he marched into Scythia, and was slain in battle.

There were two **CYRILS**, one in 375 and the other in 475.

D'ALEMBERT, a French philosopher, born 1717, died October, 1783.

DANTE, the celebrated Italian poet, was born 1265, and died in 1321. His most celebrated works are his Divina Comedia. It treats of Purgatory, Hell, and Paradise.

DANTON, a distinguished French Republican, and victim of Robespierre, was guillotined, in 1794.

DARWIN, poet and philosopher, died in 1802.

DAVID, Saint, flourished 540.

DAVID, King of Israel, flourished 1040 B. C.

DAVY, Sir Humphrey, a bold original, and successful experimentalist, and discoverer in chemistry, died 1829.

DAVID, the head of the French school of painting, was a member of the Convention and Committee of Public Safety. He died at Bruxelles, in 1825.

DEE, Dr. was a mathematician and astrologer, who also pretended to hold intercourse with spirits, in which he had credit with Elizabeth and other contemporary sovereigns.

Such was the systematic ascendancy of superstition in the age of James I., that **CASAUBON**, one of the most learned men of his time, under the patronage of the king, actually edited, in two volumes, folio, Dr. Dee's Journal of his conversation with spirits and angels. Dee used to see them in a black stone, which is still preserved in the British Museum.

DELAMDBRE, a French astronomer, died in 1819.

DEFOE, Daniel, author of Robinson Crusoe, and many works, died in 1731.

DELILLE, a French poet, author of Les Jardins, &c. died in 1803.

DEMOCRITUS, a very profound Greek philosopher, born 460 B. C., and lived above a century.

DEMOSTHENES was the most admired of Greek orators, and an Athenian patriot, who aroused the Republics against the growing power of Macedon. To save himself from Antipator he took poison, in 322 B. C. in his 59th year.

DESCARTES, Renatus, was a very able French philosopher, born in 1596, and died in 1650, after giving a system of nature, which contained many new discoveries. He taught a plenum of matter; and SPINOZA the divine omnipresence, in that matter which he called *the soul of the world*, a favourite notion of the astrologers.

DE WITT, John and Cornelius, were two Dutch patriots, who, after spending their lives in the service of their country, were, by an Orange mob, torn to pieces, in 1672.

DIANA was a Princess of Crete, daughter of Jupiter and Juno, whose name was given to the moon by the author of the nomenclature of the heavenly bodies in 1410, and whose history was rendered mythological by astrology.

DIDO was a Phœnician princess who, about 869, conducted a colony to Carthage.

DIDEROT was a powerful French philosophical writer, who died in 1784.

DIODORUS Siculus was a Roman historian, who lived in the age of Augustus.

DIOGENES Laertius was a Greek historian of the 2d century.

DIOGENES Apoloniates ascribes all things to *air*, and he adopted an element between fire and air, apparently the gas or ether of the moderns.

DŒDALUS was a famous mechanical inventor, who lived under Minos in Crete, and made automata, &c.

DOMINICHINO, painter, died 1641.

DOUW, Gerard, painter, died 1673.

DRAKE, Sir Francis, sailed round the world in 1577-80, and afterwards served as an admiral.

DRYDEN, John, poet, died 1700.

DUCIS, a French dramatist, died 1817.

EDRISSA was an Arabian geographer, in the 12th century. He described the earth as round, and gave its size as 11,000 leagues, or about 27,000 miles; and stated, that Hermes had made it 36,000, which proves that the ancient Egyptians were familiar with the shape, and approximated the size. He imagined, that south of the equator was a region of fire; and beyond the 64th degree of north latitude, was a region of ice and darkness. The Atlantic, he called the sea of darkness; and the Northern Ocean, the sea of pitchy

darkness. He described England as a country of perpetual winter, and Scotland as an island.

There were six EDWARDS, Kings of England, of whom the first was the unrelenting conqueror of the Welch and Scotch. The second was a weak prince, and put to death in 1327. The third made wars on the French Crown, and was chiefly distinguished for his enterprizing family. The fourth was great-grandson of the former, and waded to the throne through rivers of blood in the frightful wars of the White and Red Roses. The fifth was murdered in his 13th year, and the sixth died in his 16th year, in 1553.

EDWARD, surnamed the Confessor, was a priest-ridden prince of the dark 11th century. He began the touch for the King's Evil, and was a party in many miracles. His monkish habits forbade a connexion with his Queen, and, dying without issue, a doubtful succession made the kingdom a prey to a hand of Norman adventurers, who maintain their usurpations even to this day. He died in 1066, and was the last of the race of Saxon princes descended from those barbarous intruders, Hengist and Horsa.

EGBERT, King of Wessex, having had experience in the wars of Charlemagne, on succeeding to the throne, conquered the other Saxon kingdoms, and in 827 united England in one kingdom. He died in 838.

EICHHORN, a very learned German writer, died 1827.

ELISHA and ELIJAH, Jewish poets or prophets, flourished about 975.

Queen ELIZABETH, daughter of Anne Boleyn, succeeded Mary in 1558, being then 25. She sustained the Reformation during a troublesome reign of 45 years, in which she yielded herself to successive favourites. The murder of her cousin Mary stamps her as a heartless tyrant, while the execution of her favourite Essex, and her severe laws against the Catholics, rendered her the true child of Henry VIII. She was a woman of talent, if not of feeling, and died in 1602.

EMERSON, W. mathematician, died 1782.

EMPEDOCLES was a Greek philosopher, who admitted four elements, the principle of whose action was friendship and strife, or the attraction and repulsion of the moderns.

By friendship's aid, we sometimes with one
All things collect; and sometimes strife detains
All things apart, discordant borne along.

And these he makes co-ordinate with the four elements. Again, we have further confirmation in these lines—

And each with equal power is found endued,
When strife pernicious is from each apart,
And friendship equalized in length and breadth.

EPAMINONDAS, a renowned Theban, who gained the victories of Leuctra and Mantinea, was killed 363 B. C.

EPICTETUS, a distinguished moral philosopher, flourished 161 A. C.

EPICURUS, the Grecian philosopher, was born in the 100th Olympiad. His was the school of the garden. He died at 72, and his atomic philosophy has in part survived to this time; and, as a moralist, good with him consisted in knowledge and virtue.

ERASMUS, a very eminent scholar and philosopher, was born at Rotterdam in 1467. In 1510 he published his Praise of Folly; in 1516 his Greek and Latin Testament; in 1522 his Colloquies; and in 1535 his Ecclesiastes. He died in 1536, at Basle. His works fill eleven volumes in folio.

ERSKINE, Lord, was the most eloquent lawyer and most benevolent man of his age; born in 1750, Chancellor in 1806, and died in 1823.

ESCULAPIUS, a physician or personification of *air* or pure air—also a pretended son of Apollo by Coronis, daughter of Phlegus, and suckled by a goat; but the entire story seems astrological, and to relate to the Sun in Cancer, and to Capricorn as the sign ascending at his birth. In his medical character he freed Rome from a plague, probably by ventilation, and therefore had a temple erected to him there and at other places as the God of Pure Air.

EUCLID, the arranger and part inventor of geometry, was a native of Alexandria, where he flourished in the third century B. C. Euclid should be read by all between 15 and 20, as a discipline of mind. Euclid laid the foundation of modern science, by collecting the theorems of geometry; and Archimedes and others applied them with masterly address to mechanics, &c.

Prince EUGENE was born in 1663. At 26 he became a general, and was commander in all the Austrian wars for 30 years, dying at Vienna in 1736.

Leonard EULER, the chief philosopher of the 18th century, was born at Basle in 1707. In 1730 he became professor at Petersburgh. In 1741 he removed to Berlin, but in 1766 returned to Russia, and became blind, dying in 1783. His memory and acquirements were prodigious. His select works are in 18 volumes.

EUSEBIUS, a learned father of the church, was born in Palestine in 270. He was president of the Council of Nice in 325. He was not a Trinitarian, but opposed and condemned Athanasius. He died about 339. There is a Cam-

hridge edition of his works in 3 vols. folio.

EVELYN, John, naturalist; died 1706.

EYCK, Van, the first painter in oil colours. Born, 1370; and, about 1396, he painted Chaucer, the English poet.

FABII were a celebrated family at Rome, whose line produced 7 dictators, 7 censors, 48 consuls, 13 triumphs, and 2 ovations.

Lord FAIRFAX was the Parliamentary General against Charles I. He commanded at Marston Moor, Naseby, and Colchester. He was reconciled at the Restoration, and died in 1671.

FAUST was a goldsmith of Mentz, whose success in printing led the copiers to libel him as in league with the devil. He died in 1466.

FENELON, Archbishop of Cambray, author of Telemachus, and celebrated for his eloquence, was born in 1651. In 1688 he was entrusted with the education of the French princes, and in 1695 made Archbishop. He died in 1715.

James FERGUSON, an ingenious lecturer and writer, was born in 1710, and died in London in 1776.

FERMAT, a mathematician of Toulouse, who died in 1665, was the original author of many important discoveries and suggestions, of which subsequent writers have availed themselves.

Henry FIELDING, the novelist, was born in 1707; and after writing Joseph Andrews, Tom Jones, Amelia, and other works, he died at Lisbon, in 1754.

Bishop FISHER, a very exemplary character, who, in his 86th year, was put to death by the tyrant Henry, for not acknowledging his supremacy.

Nicholas FLAMMEL, a real or pretended alchemist of the 14th century, who, without known means of acquiring property, expended 2 or 300,000*l.* in building three churches and endowing 14 hospitals at Paris, besides conferring revenues on seven old ones. Such unparalleled wealth—for by profession he was only a miniature painter—leading to public enquiry, he declared his power of converting mercury into gold or silver, and also of prolonging life; and he and his wife lived to 100. Various French writers confirm this story, and of the churches and hospitals there is no question. This and other assertions of a like kind infatuated chemists for 3 or 400 years after; and it is proved by his own MSS. that our Newton, and Dr. N., an uncle of his, devoted years to re-discover the secrets of Flammel.

FLAMSTEAD, John, the first astronomer royal; died in 1719.

FLAXMAN, sculptor, died 1826.

Andrew FLETCHER, of Saltown, a distinguished Scottish patriot, was born in 1658. He attached himself to Monmouth's army, and escaped to Spain. He was an eloquent member of the Scottish Parliament after the Revolution, and died in London in 1716. His works in favour of civil liberty are valuable.

FLEURY, Cardinal, died 1743.

FONTANELLA, author of Pierre Viand, and other works, died 1812.

FONTAINE, poet, died 1695.

There were two FONTANAS, brothers, and eminent Italian philosophers. Felix, born 1730, who wrote on poisons and chemistry, and died in 1806; and Gregory, born in 1735, who wrote largely on mathematical philosophy, and died in 1803.

FONTENELLE, philosopher, died 1757, aged 100. There was a fabulist and poet of the same name.

FOOTE, dramatist, died 1777.

There were two FORSTERS, father and son, natives of Dantzic, both of whom passed the greater part of their lives in England, and wrote extensively on natural history. John Reinhold was born in 1729, and died in 1789; he accompanied Capt. Cook's second voyage as naturalist, and his son published an account of the voyage.

FOURCROY, the eminent French chemist, was born in 1755; to him we are chiefly indebted for the new nomenclature and for many important discoveries in chemistry. He died in December, 1809.

Charles James FOX, a distinguished English senator, was born in 1749; and becoming M. P. in 1768, he at first voted with the Tory party; but, on quarreling with Lord North, he opposed the American war till 1782, when he became Secretary of State, and in 1784 joined Lord North in a new ministry; but being ejected by the Pitt party, he remained in opposition till 1806, when he was again made Secretary of State, but died in a few months.

FOX, George, a religious enthusiast, died in 1690.

FRANCIS I. was a magnificent king of France, who died 1547.

There were three saints of the name of FRANCIS; one called d'Assisi, who died in 1226; the second, de Paulo, who died in 1508; the third, de Sales, who died in 1622.

FRANKLIN, Benjamin, was a very rational philosopher and distinguished American patriot, who promoted the war of independence, and died in 1790, aged 85.

FREDERIC II. of Prussia was a distinguished modern sovereign, as a successful general in complicated wars; as a philosopher and man of letters; and as a severe governor of his people. His works are numerous, and he pa-

tronized many men of letters; but his merciless imprisonment of Trenck is a staio on his character. He reigned from 1740 to 1786.

FROISSART was a chronicler from 1324 tn 1400.

FULTON, John, was an American engineer, who first practised steam navigation with suceess, and, after many other inventions, died, aged 48, in 1815.

GALILEO, the founder of mechanical philosophy, was born at Pisa in 1564, and there he received a finished education. His first discovery was the use of the pendulum as a measure of time; and, in 1589, he was made University Lecturer in mathematics, and soon after adopted the Copernican system, then beginning to excite attention. The philosophy of that time, like the present, consisted of words intended to mystify its votaries, and Galileo used to call it the *wordy* philosophy, and its teachers *paper* philosophers. About 1591 he invented or improved the thermometer, and soon after became professor at Padua. In 1597 he wrote to Kepler, stating that he had made many discoveries which he dorst not publish, "owing to the fools who worshipped previoos systems." In 1606 he invented the sector, and in 1607 he repeated and improved the magnetical experiments of Gilbert. In 1609 he tried Baptiste da Porta's idea of combining lenses to see distant fobjects, a combination which Leonard Digges, an Englishman, had also effected; and he was led tn do this by the recent formation of a telescope by some Dutch spectacle-makers. With this he at once discovered Jupiter's mooas, Venus's phases, and the ring of Saturn, and he followed these astonishing discnveries by constructing the microscnpe. These distinctioos brooght on him a torrent of abuse and misrepresentations, and in writing to a friend he remarks, that "as to advancing in pnblic opinion, or gaining the assent of the *book* philosophers, let os abandon both the hnpe and desire." He now removed to Finrence, and resided in the court of the Grand Duke with a large pension. In 1611 he discovered at Rome the spots in the sun; but all these facts being inconsistent with the Jewish cosmography, the priests began to preach against him, and in 1615, to the eternal disgrace of the Catholic church, he was arraigned before the inquisition, and, though discharged, they condemned the doctrines of Copernicus, and forbade them to be taught, or the books describing them to be circulated. He now returned to Florence, and wrote his Dialogue on the Ptolomaic and Copernican systems, leaving the readers tu decide between the speakers, and published it with license in 1632, for which he was again arraigned and tortured, and at 70 made to abjure publicly on his knees, and to curse his own book and doctrines, and sentenced for the next three years to remain in prison, and repeat once a week the seven penitential psalms. To all this he submitted, to escape the fate of *Bruno*, who for similar opinions had been hurnt at Rome but 32 years before. His powerful friends, however, enabled him to make their houses his prison for three months, and he was then allowed to live at home, but not to go abroad, or to receive visits. In 1636 he became blind, and in 1638 he was allowed, on the same conditions, to pass a few months at Florence, and to receive a friend in presence nf an officer of the inquisition. His last discoveries were the moon's librations aod the cause, and his last project the determination of the longitude by Jupiter's moons, to which he united an improvement of time-pieces. In 1636 he finisbed his dialogues on motion; but as the inquisition had forbidden every thing under his name, they were, after much difficulty, printed in Holland. In this work he explained the rectangle of velocity and quantity, or equal momenta, but quoted Aristotle for the priuciple; and he also developed what are called the laws of motion, of falling bodies and projectiles, principles rhapsodized by Descartes, and mystified by Newton. After he became quite blind, and very infirm, the inquisition relaxed. He died in 1642, aged 78. Nor was he the mere philosopher, for he wrote the purest Italian, and coltivated the belles-lettres. He used to say, that reading Tasso afier Ariosto was like eating eucumbers after melon. He was married, had children, and was a great conuoisseur in wines. After his death, being still under sentence, his right to make a will was disputed, he was denied Christian burial, and his MSS. were seized aud partly in lost.

GALEN was a physician of Pergamos, and died in 140, aged 70.

GALVANI was an Italian experimentalist, who discovered the mode of exciting electrical action, by opposing bodies of different affinity for oxygen, and first displayed it in frogs. He died in 1798.

GAMA, Vasco de, was a Portugnese navigator, who first discovered the Cape of Good Hope in 1497, and established the Portugnese in India.

GARDINER, Bishop, was brought np onder Wolsey. He was by Heory VIII. made Bishop of Winchester, and a leading instrument in his murders. In the next reign he was committed to the

Tower, but under Mary he was made Chancellor and first Minister, directing the fires in Smithfield. He died in November, 1555.

GARRICK, David, was an unrivalled player, and a man of great genius. He died January, 1779.

GASSENDI, Peter, one of the most eminent of the restorers of mechanical philosophy and astronomy, of the school of Galilei, died in 1655, aged 63. He taught that all our ideas are derived from, and compounded of, sensations. Hobbes taught the same; and Locke followed them, superadding *reflection*, or ideas derived from the operation of the understanding, posterior to ideas derived from sensation.

Dr. GAUDEN was believed to be the author of the *Ison Basilike*, which he caused to be printed as the production of Charles I. He died a disappointed bishop of Worcester, in 1662.

GAY, dramatist and poet, died 1732.

St. GEORGE, called the patron saint of England, was a profligate fanatic of the fourth century, born in Cilicia, and at first engaged as contractor for the army; but, his peculations being detected, he fled, and, turning Arian, contrived to eject and succeed Athanasius as bishop of Alexandria, where he committed great atrocities; but, on the accession of Julian, he was finally torn in pieces by the populace. The Arians, on joining the Catholics, got George enrolled, and he was adopted by the English princes as their patron in the Crusades.

GIBBON, Edward, a very able and laborious historian of the Roman empire. He died in 1794.

There were two modern GIFFORDS, both political writers in support of the court of George III. John, the editor of the Antijacobin Review, and a police-magistrate. William, a poet, editor of the Quarterly Review, who held also two appointments under government. He died in 1826.

GILBERT, William, an experimenter on magnetism, which, agreeably to the then prevailing philosophy of witchcraft, he ascribed to attraction, and all the phenomena to a central magnet in the earth, which he considered an intelligent principle. His elaborate researches paved the way to some speculations of Bacon, and the hypotheses of Newton. He died in 1603.

GLANVIL, Joseph, M. A., was one of the first members of the Royal Society, and famous for his illustrations in confirmation of witchcraft published in 1670.

GLAUBER, chemist, flourished in 1660.

GLENDOWER, Owen, the last of the heroic patriots of Wales, died in 1415.

GLOVER, Richard, poet, died 1785.

GODFREY, King of Jerusalem, one of the martial fanatics in the first crusade. He took Jerusalem in 1099, and won the battle of Ascalon, but died in 1100. He is the hero of Tasso.

GODOLPHIN, made an Earl by Anne, and the head of her Whig ministry, was an active politician in the reign of Charles II. James, and William. He died in 1712.

GODWIN, Mary Wolstonecraft, an ingenious woman, who wrote a Vindication of the Rights of Woman, and other original works. She died in 1797.

GOLDSMITH, Oliver, poet and dramatist, died 1774.

GORDON, Lord George, son of the Duke of Gordon, who, as the presenter of a petition against Catholic concessions, in 1780, was charged as an instigator of the mob riots, in which not even any of the petitioners were implicated. He was tried and acquitted; but, persecution continuing, he turned Jew, and was imprisoned, from inability to find most exorbitant bail, till his death in 1793.

The GRACCHI were two brothers, Tiberius and Caius, who advocated the rights of the poor against the usurpations of the nobles, by insisting on the equal distribution of the public lands acquired by conquests. For this Tiberius was murdered by the Patricians in 133, and Caius in 121, B. C. The subsequent accumulations in few hands proved ultimately the ruin of liberty.

GRAMMONT, Count de, was a courtier of Louis XIV. and Charles II. celebrated by his Memoirs of the profligate court of England. He died in 1707.

GRAVES, Richard, the colleague of Pope, Shenstone, Melmoth, Allen, Pratt, &c. and author of some elegant works, died 1807, at 92.

GRAY, the author of the Elegy in a country church-yard, and other superior poems, died 1771, aged 55.

GRÆVIUS and GRONONIUS, contemporary editors of Greek and Latin authors, lived in the end of the 17th century. And there were five other Grononiuses, sons and grandsons, in the same career of verbal criticism and emendation: the last also a naturalist, and he died in 1777.

Pope GREGORY, called Hildebrand, flourished in the 11th century. He excommunicated the Emperor of Germany, and commenced that arrogant system of ecclesiastical domination which ultimately led to the reformation.

GRESHAM, Sir Thomas, a munificent London merchant, died 1579.

Lady Jane GREY, famous for her

precocious talents and tragical end. She was daughter of the Duke of Suffolk, and grand-daughter of Henry VII. She was married at 16, in 1553, to the fourth son of the aspiring Duke of Northumberland, who got her proclaimed queen in prejudice of Mary, her own father heading an insurrection in her favour. She and her husband were beheaded in Feb. 1554.

GROTIUS, or De Groot, was a learned Dutchman, a Jurist, Scholar, and Theologian. He died in 1645.

GUIDO, painter, died 1642.

GUILLOTINE, introducer of that merciless instrument, was a French physician, who died in 1814.

GUSTAVUS VASA was King of Sweden, from 1523 to 1560; and his grandson, Gustavus Adolphus, from 1611 to 1632, when he was killed in a victory gained over Wallenstein at Lutzen.

GUY, Thomas, a miser, who, dying in 1724, left nearly half a million to various charities and a hospital.

GUYTON MORVEAU, a very distinguished French chemist, and author of many discoveries. He died in 1815.

HAFIZ, a Persian poet of great popularity, died 1389.

HALE, Sir Matthew, a pious judge, who, though a philosopher, yet in that age of superstition condemned to death some persons accused of witchcraft, so late as 1664. He died in 1676.

HALLEY, Edmond, a very enterprizing mathematical philosopher, who flourished from 1675 to 1742.

HAMPTON, John, a leader in the cause of English liberty, who was killed in a skirmish near Thame, in 1643.

HANDEL, G. F. the prince of musicians, born 1684, and died in London 1759.

HANNIBAL, a Carthaginian general, who, in 219 B. C. took Saguntum, in 216 gained the great battle of Cannæ, and in 183 died in exile.

HANWAY, Jonas, a philanthropic merchant and eastern traveller, who died 1786.

HARRIS, James, a learned philologer and philosopher, died 1780.

HARRISON, John, a very ingenious mechanic, who received the parliamentary reward of 20,000*l.* for a perfect time-keeper. He was born near Pontefract, and died in 1815.

HARVEY, discoverer of the circulation of the blood, was born 1578, died 1658.

HARGREAVE, James, an ingenious mechanic of Blackburn, who, about 1765, invented the spinning-jenny, and subsequently other important parts of cotton machinery. He died poor, at Nottingham, in 1778, and left a family, who have lived in great indigence at Manchester.

HASTINGS, Marquess of, a benevolent English statesman, and Governor-General of India from 1812 to 1822. He died 1825.

HAWKESWORTH, Dr. poet and polite writer, died 1773.

HAYDN, F. I. a very eminent musician, died 1809.

HAYLEY, W. poet, died 1820.

HELVETIUS was a very able French metaphysician, born 1715, and died 1771. He ascribed the differences, in the minds of men and brutes, to bodily conformation and organization; BLUMENBACH, to the different quantities of the medullary substance in the brain. GALL, to the parts of the brain principally developed. CUVIER agrees with Blumenbach and Helvetius.

HELENA, the mother of Constantine the Great, was a native of Colchester, where some say her father was an Innkeeper, and others a person of high rank; and became pregnant by Constantius Chlorus, the Roman commander, and afterwards associate with Dioclesian. The Greeks, however, aliedge, that she was born at Drupani, in Bythynia, afterwards called Helenopolis, that Constantius stopped at her father's inn on his embassy to Persia. Her education in this low sphere had brought her into contact with the sect of Christians. She lived through the reign of her son, and died in the same year 337, upwards of 80, having through life exerted all her influence with her son and grandsons in favour of the Christians. Her grandson JULIAN, who became Emperor in 360, and who had been educated among philosophers at Athens, reversed all her plans, reopening the Heathen temples and closing the Christian. But he was killed in a Persian war, after a short reign.

There have been eight HENRYS Kings of England. The first, son of the Conqueror; the second, an amiable prince, disturbed by the arrogance of Becket and the priests. The third, a pusilanimous king. The fourth, a usurper. The fifth, his son, who won the battle of Agincourt, in 1415. The sixth, his son, an imbecile, with a disputed throne; but supported by his Queen, Margaret. The seventh, a usurper, miser, and tyrant. The eighth, the English Nero, who was restrained while Wolsey reigned; but, released from the dominion of that great man, he disgraced England by his robberies and horrible executions, to gratify his lust.

HEROD the Great, a king of Judea, highly extolled by Josephus, born 71 B. C. and died about two years after

the birth of Christ. There were three other Herods, the last of whom died about 94 A. C.

HERODOTUS, the first Greek historian and father of history, according to Cicero, lived about 450, and there is this proof of the credit due to him, that his work was read in public, made known at once to the whole world, and honoured and praised by all. He was contemporary with Pindar, Sophocles, Pericles, Phidias, Euripides, and Hippocrates, an age of perfection in every pursuit.

HESIOD, a Greek poet, of the previous age to Homer.

HEVELIUS, an astronomer of Dantzic, died 1687.

HEYNE, a German critic, died 1814.

HIRAM was King of Tyre, about 1020, when Solomon built the Temple.

HIPPARCHUS, astronomer, flourished 200.

HOBBES, Thomas, a metaphysical politician of the 17th century, who died in 1679, aged 91. In some of his works he asserts that Ezra wrote the Pentateuch, and that the New Testament was not received as canonical till the Council of Laodicea, in 364.

HOGARTH, an English painter of life and manners, without a rival, died 1764.

HOLCROFT, Thomas, dramatist, died 1809.

HOLLAR, engraver, died 1677.

HOLT, Sir John, a very honest English judge, L. C. J. from 1690 to 1709.

HOME, John, author of Douglas, and other dramas, died 1808.

HOMER, the father of poetry, and author of the Iliad and Odyssey, was a native of Chios or Smyrna, and an illegitimate child, originally named Melesigenes. Becoming blind in Ithaca, he consoled himself with poetry, and became a travelling bard. He died at Ios, and his tomb used to be shewn there. Aristotle says he was born and died in Chios. Licurgus first collected his poems. The Parian Marbles state that he flourished 907 years B. C., or 250 years after the time which he assigns for his legend about Troy.

HORACE flourished 45 B. C.

HOWARD, John, commonly called the Philanthropist, was a Bedfordshire gentleman, who visited prisons throughout Europe, and his enthusiasm created the attention of governments, and led to many alterations; but being a decided disciplinarian, his alterations were not always ameliorations. His philanthropy led him to visit Turkey, where he died of the plague, in January, 1790. His attentions to the subject have, however, led to many valuable improvements, but his cruel plan of solitary cells has yielded to public feeling.

HUME, David, a Scotch writer, was born in 1711, and died in 1776. He wrote history and on metaphysics, and rejected or doubted all knowledge not derived from the senses, *i. e.* those ideas derived from reflection, or the operations of the understanding; and, to get rid of the causes invented by Newton, and which he was told were *demonstrated*, he denied the necessary connexion of cause and effect.

There were two celebrated HUNTERS, brothers; one William, who died in 1783, and John in 1793.

HUSS, John, an heroic reformer, burnt at Constance, July 7, 1415.

There were in the last age three celebrated HUTTONS, James, a speculator in natural philosophy, who died in 1797. William, an industrious antiquary, who died in 1815. And Charles, a very able mathematical philosopher, who died in 1823.

ISAIAH, a Jewish poet, was nearly contemporary with the first Olympiad in 776.

JEFFERSON, President of the United States, and much distinguished for his wisdom and patriotism, died July 4, 1826, the 50th anniversary of independence, on the same day as the elder Samuel Adams, who, with Hancock, had been exempted from the Royal Amnesty of 1776.

JEPHTHA, a Jewish hero, who sacrificed his own daughter, and contemporary with the taking of Troy, in 1184.

JOAN of ARC, a country girl, who, in 1429, in conformity with the superstitions of the age, avowed she was commissioned by heaven to expel the English out of France. She was accordingly invested with a command, and raising the siege of Orleans, gained several great advantages, and assisted in crowning the French king at Rheims. Her mission was ended, but she was prevailed on to undertake the defence of Compeigne, and being taken prisoner, she was by the execrable Duke of Bedford, Regent of England, burnt as a sorceress at Rouen, in 1431.

King JOHN, the fifth son of Henry the 2d, was born in 1160, and though his father's favourite, he joined his brothers in rebellion, which broke his father's heart, in 1189. He then rebelled against his brother, Richard I., and kept him prisoner in Austria. On the death of Richard he made war on his nephew Arthur, and rightful heir to the crown, and taking him prisoner, murdered him in prison. In 1207, his tyranny led the Pope to put the kingdom under an interdict. All the Bishops, &c. left the kingdom, and for seven

years no divine service was performed. He now quarrelled with the Barons, lost his dominions in France, and committed an atrocious massacre on his Welsh hostages. He then sought an alliance with the Saracens in Spain, offered to deliver England to them, and turn Mahomedan. At length, in 1213, the Pope appointed Philip of France to remove him, and, on May 13, he resigned his crown and realm to the Pope's Nuncio at Dover, when the interdict was removed. The Barons now extorted from him Magna Charta, on June 15, 1215; but, to avenge this, he brought over foreign auxiliaries, and got the Pope to annul the charter, and excommunicate the Barons, against whom he commenced hostilities. These invited the French King, and the Dauphin landed at Sandwich, May 30, 1216, with a force brought in 660 ships. He advanced to London, and was well received every where, the nation declaring for him. John, in despair, attacked Lincoln, and fixed his head-quarters at Lynn; whence, crossing the Wash he lost his baggage and money, and died at Newark, October 19, 1216, of a dysentery.

JOSEPHUS was a learned Jew, born 37 A. C., and after a youth of study, became a leader against the Romans, but being taken prisoner, was received into the favour of Vespasian and Titus, and present at the siege and destruction of Jerusalem. He afterwards lived at Rome, and wrote his various works. He is by the Jews called Ben Gozion, and their copy differs considerably from the ordinary translation from the Greek.

JUNO was the wife of Jupiter, King of Crete, and mother of Vulcan, Mars, Mercury, Apollo, and Diana or Hebe.

JUPITER, King of Crete, about 1300 B. C.; after whom, about 1100, the major planet was named, and after whose family, the other planets. His own planet being astrologically very potent, he was, by the astrological priests and poets, converted into the chief of the gods, and his history rendered legendary and mythological, in those heroic, fabulous, and astrological ages.

KANT, Immanuel, a Prussian logician, and metaphysical systematizer, was born 1724, and died 1804. He divides philosophy into Physics, Ethics, and Logic. The two former are *material* sciences, which take cognizance of external and internal facts; whereas the latter is purely *formal*, and treats only of the *form* and connexion of our thoughts. Sense is the faculty which receives the matter of all the phenomena of nature; it is therefore *passive*, and has only two modes or forms of receiving. It consists therefore of the two receptivities, *time and space*. Reason is a faculty that acts quite independently of time and space, by its *six pure activities*, which are the Six Ideas—Absolute Totality; Absolute Limitation; Absolute Substance; Absolute Necessity; Absolute Cause; Absolute Concurrence. His system begins with six axioms:—1. Consciousness, or egotism. 2. Time, the *form* of internal sense. 3. Space, of external sense. 4. Sense for intuition. 5. Understanding for conceptions; and 6. Reason for ideas. Intuitions are, he says, present in time and space; Conceptions, absent in time and space; Ideas, things out of time and space; and the three generate mind. He then asserts, that TIME and SPACE are in the mind, and are the receptivities of SENSE. UNDERSTANDING, he refers to Aristotle's four categories of quantity, quality, relation, and mode; and their species unity; Many, the whole; Existence, negation, size; Property and Accidents, cause and effect, action and re-action. Possibility, certainty, necessity. Reason, he founds on the categories in their absolute sense, as totality, limitation, substance, cause, concurrence, necessity.

LACEPEDE, Count, a French naturalist, and long President of the Senate under Napoleon. He died of the small-pox, at 69.

LA PLACE, a very profound mathematician, died 1825.

LA GRANGE, a very profound mathematician, died 1805.

LANJUINAIS, Count, one of the most enlightened patriots of the French Revolution, which he survived, and died 1827.

LEAKE, Sir John, a distinguished English admiral, who died 1720.

LEIBNITZ, G. W. a celebrated Saxon philosopher, contemporary of Newton, Locke, and Clarke, and inventor of the Differential Calculus. He was born in 1646, and died 1716. He taught *a pre-established Harmony*, by which the mind contains general notions and truths, like the plant in the seed, so that, according to him, "every thing goes on in the soul, as if it had no body; and in the body, as if it had no soul. *Opticism*, or the doctrine that this is the best of all possible worlds, was an inference from *the pre-established harmony*, which he assumed to be formed by the Deity, and therefore perfect. Another mystical phrase of his was *the sufficient reason*, which merely meant that nothing happens without a sufficient reason why it should be so, rather than otherwise. And another, *the law of continuity*, meaning that motion

is never lost, which, extending to soul, he maintained that it never ceases to think, even in sleep or in a fit.

Nature, says his disciple HELVETIUS, never proceeds *per saltum*, (never jumps), and the law of continuity is exactly preserved. The two great principles of Leibnitz were, that it is impossible for a thing to be, and not to be, at the same time; and that nothing is without a sufficient reason why it should be so, rather than otherwise.

LEUCIPPUS, a Greek philosopher, asserted that atoms, the elements of all things, were infinite, and always moved; and that they were of various forms, thereby generating and characterising different bodies in figure, order, and position. Democritus and Metrodorus followed Leucippus; and added, that the full and the void are the first causes of things. Zeno, Leucippus, Democritus, Protagoras, and Epicurus, were the inventors of the Atomic System, in which they ascribed the composition of all bodies to smaller and smaller parts, in various forms, called Atoms, at present the principle of chemistry.

LIVY, historian, flourished 15 B.C.

LOCKE, John, a political and philosophical writer, born in 1632, and educated at Oxford. He was patronised by the Earl of Shafesbury, and obliged to retire with him to Holland in 1682, and there he wrote his Essay on the Human Understanding. He returned with the Prince of Orange, and died at Otes, in 1704.

LUCRETIUS, poet, flourished 80 B.C.

Mrs. MACAULEY, who married a brother of the noted Dr. Graham, is celebrated as the author of an excellent History of England; much admired for its independant spirit, and much abused by the Court party. She wrote also some Polititical Pamphlets, and died in 1791.

MACHIAVEL, an Italian writer and statesman, was born in 1461. He wrote some works of history, and a treatise on government, called the Prince; a Book containing such infamous doctrines, that it is disputed whether it was serious or ironical. He died in poverty, in 1527.

James MACPHERSON, editor of Ossian, was born at Inverness, in 1738. In 1758, he published his first fragments of ancient poetry, collected in the Highlands. In 1762, he produced *Fingal;* and, in 1763, *Zemora* and others. He died in 1796.

Madame DE MAINTENON was born in 1635, and married Scarron, an ingenious poet, who died in 1660, and left her in indigence. In repeated petitions to Louis XIV. for a pension, she drew his attention, and obtained an appointment in the Royal nursery—becoming a favourite of the king, who ultimately married her. She survived him, and died in 1719.

MANDEVILLE, celebrated as the author of the *Fable of the Bees*, published in 1723. He wrote other works, and died in 1733.

MANICHÆUS, the founder of an early Christian sect, and a Persian by birth. He wrote a gospel, but attacking the Persian religion, he was crucified, or flayed alive, about the year 277.

Mrs. MANLEY, an ingenious female writer, was born about 1660, and wrote the new Atalantis; two tragedies called the Royal Mistress, and Lucias; and the comedy of the Jealous Lover, besides other works. She died in 1724.

Lord Chief Justice MANSFIELD, whose first name was William Murray, was born in 1705. In 1742, he became solicitor-general, and in 1756 was made chief-justice of the King's Bench; an office which he filled for 32 years, and died in 1793.

Mrs. MASHAM, was the intriguing favourite of Queen Anne, and supplanted the Duchess of Marlborough. Being connected with the Tories, she produced a change in the government. In return, her husband was ennobled, but the family extinct.

MASSINGER, an English dramatic writer, was born in 1585, and cotemporary with Shakspeare, whose writings he imitated. He died in 1639.

MASSENA was the most distinguished of Napoleon's marshals, and called by him, "the Darling of Victory." He was created Prince of Essling, for his services in that great victory in 1809; and, fond of money, he died immensely rich, in 1817.

MASSILLON, a celebrated oratorical preacher, who flourished in the early part of the 18th century, and died in 1742. His works are remarkable for the splendour of their eloquence.

MARAT, a French demagogue, was born in 1744, of Protestant parents, and educated in Medicine. He published various works on Natural Philosophy, in which he displayed considerable talents; but the abuses in the government, and the growing strength of an opposing party, rendered him a politician, and he published a cheap journal, called the *Friend of the People*, which became an authority with the republican party. He was also the leader in the club of the Feuilians, and very active in the commotions of 1792. The Moderés denounced and prosecuted him, and, in July 1793, he was stabbed by Charlotte Cordey.

Carlo MARATTI, a distinguished Italian painter, was born in 1625, and died at Rome, in 1713.

MARIE ANTOINETTE, Queen of Louis XVI., was a daughter of the Emperor of Austria, and married in her 15th year. She was beautiful, and possessed the best feminine qualities, but extravant and dissipated, and therefore became the butt of public discontent. In October, 1789, she and her husband were brought from Versailles to Paris, where their plots to emancipate themselves led to the catastrophe of August 12th, 1792, on which the Royal Family were closely imprisoned in the Temple. Here her submission to the violent temper of her husband, and her general amiable conduct, belied public report; but she fell a victim to prejudice, in Oct. 1793, nine months after her husband had suffered a similar fate.

MARIUS was a distinguished Roman. In 108 B.C. he defeated Jugurtha, King of Numidia, and soon after conducted some bloody wars in Gaul. He was then six times Consul; but being thwarted by Sylla, he fled to Africa, and returning, committed unparalleled legal murders on the friends of Sylla, and died 86 B. C.

MARMONTEL, an elegant French writer, was born in 1723, and becoming the popular editor of the *Mercure de France*, he acquired great celebrity by his writings in that work, and by his exquisite moral tales. He died in 1799.

There were three MARK ANTONYS. The first, a patriot, was murdered by Marius. The second held great power. And the third killed himself in Egypt, in 30 B. C.

MARS was a son of Jupiter, King of Crete, after whom, about 1400, the fourth planet was named.

Benjamin MARTIN, an industrious and ingenious writer, was born in 1704, and at first a travelling lecturer on natural philosophy, and afterwards an optician in Fleet-street. The absurdity of the bankrupt laws led him, in 1782, being then 78, to commit suicide.

Andrew MARVEL was a patriotic English senator, born in 1620, and educated at Cambridge. He was employed by Cromwell, and as an assistant of Milton. In 1660 he became M. P. for Hull, and till his death, in 1678, was an incorruptible M. P.

MARY, Queen of Scots, was daughter of James V. and of a French Princess. Her father dying a few days after she was born, her mother sent her to France for education, and at fifteen she was married to the Dauphin, who, becoming King, died in six months, when she returned to Scotland, a widow of 18. Here she married the handsome Lord Darnley, a weak profligate, who murdered Rizzio, and was himself destroyed in 1567. Soon after she married Bothwell, suspected of the death of Darnley, which drove the people to rebellion, and Bothwell fled to Denmark, and Mary to England, where her cousin Elizabeth kept her in confinement for 18 years, and then, on the most paltry pretence, and with true court morality, caused her to be beheaded, in 1587, at the age of 38. She was a very accomplished woman, and her story, taken altogether, is most affecting. She was the victim of her own education, of the ambition of others, of the dirty jealousy of Elizabeth, and of the contests between the Romish and Protestant Church interests.

MAUPERTUIS, a French philosopher, was born in 1698. He measured a degree of latitude in Lapland, and after otherwise distinguishing himself, he died in 1759.

Thomas MAURICE, a modern poet of eminence, was born about 1750; and educated in Christ's Hospital and Oxford. Besides his poetical productions, he wrote some works on oriental history and theology, and died in 1824.

MEYER, was an extraordinary proficient in mathematics and astronomy, for whose lunar tables, the English government paid 3000*l*. He was a professor at Gottingen, and died in his 39th year, in 1762.

MAYOW, John, was an English physician, who was educated at Oxford, and died in his 34th year, after publishing some chemical works, in which he developed many of the principles claimed as discoveries a century after.

Cardinal MAZARIN, a political churchman, born in 1602, who succeeded Cardinal Richelieu, as minister to the Court of France, the government of which he conducted with questionable wisdom, till his death, in 1661.

Dr. MEAD, a literary physician, born in 1673, who flourished in London till 1754.

De MEDICI was the name of an Italian family, whose fame will for ever be connected with commerce, the arts, and literature. The founder was John, a merchant of Florence, who died in 1428. After accumulating immense wealth, his son Cosmo being contemned by the Florentine Aristocracy, removed to Venice, but was speedily invited back, and became the patron of every thing which adorns the human character. He died in 1464. His grandson was Lorenzo, whose liberality procured him the name of the Magnificent. He first established academies and a public library; and, by his moral in-

fluence, became the virtual sovereign of Florence. He died in 1492, aged 44.

MELANCTHON, an associate of Luther, and learned reformer, who made converts by the variety of his learning and writings, though it is to be lamented that Calvin quoted his sanction for the unpardonable crime of burning the Unitarian philosopher Servetus. He died at Wittemburgh in 1560.

William MELMOTH, a tasteful writer of the English language, and an elegant translator, was born in 1740, and died in 1799. His father was the author of a popular tract, called the Great Importance of a Religious Life.

MENAGE, a writer in polite literature, much esteemed in France. He was born in 1613 and died in 1692.

MENDELSOHN, a learned modern Jew, born in Anhalt, in 1729. He was intimately connected with the German literati, and wrote some valuable works of Metaphysico Moral Character. He died in 1785.

MENTCHIKOF, a celebrated Russian. At 13 he cried pies about the streets of Moskwa, and in that employment found his way into the imperial kitchen, where he saw a man of rank go to a particular stew-pan and empty a powder into it. Mentchikof observed that he did it slily, and he was led, in consequence, to ask what that dish was. On being told that it was a favourite dish of the emperor, he suspected something wrong, and desired to speak with the emperor, but was repeatedly thrust out. He, however, made so much noise, that the emperor came forward to enquire the cause; and the boy, falling on his knees, told him he had something to communicate in private, and the emperor consented to listen to him. He then ordered the nobleman and the dish to be brought before him, and drawing his sword, ordered him to eat it. He hesitated, but Peter was peremptory; when, at length, the nobleman fell on his knees, and made a full disclosure of a plot to poison the emperor. The boy Mentchikof was, in consequence, taken into such favour, that he was soon after made governor of Ingria, with the title of prince. He afterwards accompanied Peter on his travels, and often passed for the Emperor, and the emperor as his servant. On the death of Peter, he continued in equal favour with his successor Catherine I.; so that he became the first subject in Russia, and proposed the marriage of his daughter to the next heir; but Catherine dying, the enemies of Mentchikof prevailed, and he was suddenly stripped of all his wealth, and himself and his family banished into Siberia, where he died, two years after, in November, 1729. His children, after suffering great hardships, were recalled a few years after, and restored to their father's rank and property by the Empress Ann.

MERCURY was a Greek name of Thaut, or Hermes Trismegistus, the inventor of letters. His name being given to a Cretan prince, and the first planet being named after him, ignorance and astrology deified him. The quick motions of his planet led him to be considered the messenger of the gods.

METASTASIO, an Italian dramatist, born in 1682. He was at first a strolling boy poet; and at 14 he wrote a tragedy. His subsequent works were very numerous, among which were 26 operas, 8 oratorios, and an immense variety of lyric compositions. He died in 1782.

Dr. Conyers MIDDLETON, an eloquent English writer, was born in 1683, and educated at Cambridge. His chief works are, his Letter from Rome, his Life of Cicero, and his Free Inquiry. He also wrote a number of Controversial Pieces, which are the best models of English style and composition. He died in 1750.

MIERIS, a Dutch painter of the first eminence, born in 1635, and died in 1708.

Joseph MILLAR, commonly called Joe Millar, was born in 1684, and was a favourite low comedian. He died in 1738. His Jest Book was compiled by one Motley, and his name prefixed simply because he was a favourite with the populace.

John MILTON, author of Paradise Lost, was born in Bread-street, London, in 1608, and educated at Cambridge. He afterwards resided at Horton, and there wrote his best smaller pieces. In 1638 he made the tour of Europe, and, on his return, opened an academy in Aldersgate-street, and wrote some of his political works, in a decided republican spirit. He defended the trial and execution of Charles, and replied to the Icon Basilike, and also to the work of Salmatius, which he published in 1651, and received 1000*l.* from Cromwell. His exertions brought on incurable blindness. At the Restoration he was obliged to conceal himself, his books being ordered to be burnt. In his retreat, he recommenced and finished his Paradise Lost, and it was printed in 1667. In 1670, his Paradise Regained appeared, and his Samson Agonistes. He died in November, 1674.

General MIRANDA, a man of extraordinary endowments, and a native of Peru. In 1806, he sailed with an expedition from the United States, to revolutionize South America, and made some progress; but, in 1811, was taken

prisoner, sent in chains to Cadiz, and treated with such cruelty that he died.

MIRABEAU, an eloquent French orator, was born in 1749, and a member of the National Assembly, in 1789. He was distinguished for his eloquence and patriotism; but died in April, 1791, in the midst of his career.

George MONK, Duke of Albemarle, was born in 1608. In the civil wars he sided with the King, but was employed by Cromwell, and, at his death, influenced the army to declare for the Restoration, for which he was raised to the highest dignities by Charles II. He was both general and admiral, commanding the English fleets, which fought the Dutch in both wars. He died in 1670.

Charles MONTAGU, Earl of Halifax, a man of talents and Prime Minister to King William, who, on the suggestion of Bishop Burnet, commenced the ruinous funding system. He was not employed by Queen Anne, but distinguished by George I. and died in 1715.

MOLIERE, a very eminent French dramatist, born in 1620, and died in 1673.

Lady Mary Wortley MONTAGU, an English woman of extraordinary talents, was daughter of the Duke of Kingston, and born in 1690. In 1712, she married Mr. Wortley, who, in 1716, went Ambassador to Turkey. Here she wrote her celebrated Letters. In 1718, they returned to England, and Lady Mary figured in the fashionable world till 1739, when she retired for her health to Italy, and wrote other published letters. In 1761, she returned to England, and died in the following year. Her daughter married the Earl of Bute, then the Royal favourite, and her son was the eccentric but learned Edward Wortley Montagu, who spent his latter years in Egypt, having embraced the Mahomedan religion, and dying in 1776.

MONTAIGNE, a pleasing French writer, was born in 1533, and died in 1592.

MONTECUCULI, a celebrated Italian general, was born in 1608, and after commanding in numerous wars with preeminent distinction, died in 1680.

MONTEZUMA was emperor of Mexico in 1519, when it was invaded by the Spanish banditti under Cortes, who, after committing great atrocities, imprisoned Montezuma, and in an attack on the Spaniards by the Mexicans, the unfortunate Emperor was killed by a stone in 1520.

Sir Thomas MORE, an able Chancellor to the bloody tyrant Henry VIII. was born in 1480, and being patronized by Wolsey in 1530, he succeeded him; but, being a bigotted Catholic, he refused to take the oath of supremacy, and, after a long imprisonment, was beheaded in July, 1535.

MOREAU, a French revolutionary general, was born in 1763, and in 1794 commanded an army in Flanders, and became commander-in-chief on the Rhine. In 1800 he gained many victories; but, disliking the government of Buonaparte, he joined with Pichegru in a conspiracy, for which he was tried and convicted, but allowed to depart to America. In 1813 he joined the allied sovereigns in the war against France; and, on making his first observation, was killed by a cannon-ball before Dresden.

MOZART, the eminent composer, born in 1756, was a prodigy in music from his childhood. After astonishing and delighting the world by a great variety of matchless works, he died in 1792.

MURILLO, an eminent Spanish painter, was born in 1613, and died in 1685, by a fall from a scaffold while he was painting.

Arthur MURPHY, a successful English dramatic writer, was born in 1727. He wrote the Grecian Daughter, the Orphan of China, and other pieces, besides translating Tacitus, and died in 1805.

Joachim MURAT, one of Napoleon's marshals, was born in 1771. In 1800 he commanded the cavalry at Marengo, and in 1806-7 at Jena, Eylau, and Friedland; in 1808 he was made King of Naples, and in the Russian expedition commanded the cavalry; but, on the misfortunes of his patron, in 1815, he was ejected from Naples, and returning again, was seized on landing, and shot, October 13, 1815.

There were two MYRDDINS or MERLINS; one the minister and architect of Ambrosius, who succeeded Vortigern, and built Stonehenge, called Myrddin Ambrosius, and whose skill in bringing the stones from Ireland obtained him the name of Enchanter; and Myrddin or Morvryn, a British poet and prophet, contemporary with Taliesin, who lived in the following century, and died in Bardsey.

NADIR, Shah, was an usurper of the throne of Persia, born in 1686. Being intrusted with the command of an army, by Thamas, king of Persia, on being ordered to disband it, he seized the Shah, and proclaimed himself regent, and, in 1736, king. In 1734 he marched into India, took Delhi, and massacred 100,000 of the inhabitants, robbing the country of 100 millions sterling; but, in 1747, he was assassinated in his tent, after committing frightful enormities of all kinds.

Lord NAPIER, of Merchiston, sug-

gested the logarithmic principle of corresponding series; but we are indebted to Henry Briggs, Gresham professor of geometry, for the tables of logarithms as they now exist, and also for those of sines and tangents. Briggs computed them to 14 plans of decimals, and published them in 1624. He also passed through the astonishing labour of computing natural sines to 15 plans and the 100th of a degree! Gellibrand and Vlaco perfected them after Briggs's death.

NAPOLEON, emperor of the French, &c. and a man of the most singular fortunes. He was born in Corsica in 1769, and was educated in the military school of France. Obtaining rapid promotions under the revolutionary government, he was, in 1795, appointed to the command of an ill-provided army, on the Italian frontiers; but, by his vigour and genius, he defeated the numerous armies of Austria, overran Italy, and, in 1797, forced the Italian states and Austria to make peace. He afterwards embarked with his army for Egypt, and overran that country and great part of Syria; but the abuses in the French government led him to return to France, and, in a few weeks, he overturned the government, and, as first consul, placed himself at its head. In 1800 he crossed the Alps, and defeated the Austrians at Marengo, and, in 1801, sought peace with all the Courts which had made war on France. In 1803 some new confederacies of ancient governments were formed against him; but, penetrating into the countries of his enemies, he gained, in the following ten years, a series of unparalleled triumphs at Ulm, Wagram, Jena, Friedland, Austerlitz, &c. becoming, in effect, dictator of the European continent, and following his victories by seeking treaties of peace, which the implacable hatred of the old governments always abused. In 1812 he advanced to Moscow, and his return being intercepted by an early winter and treacheries, his army perished in frost and snow, and Europe being raised against him, he was defeated at Dresden, and France was invaded on all sides. Paris was surrendered by treachery, and he was obliged, under treaty, to retire to Elba in 1813. But the treaty not being respected, and it being formally proposed in the congress at Vienna, to seize him, and send him to St. Helena, he anticipated the base design, by landing in France with only 800 men, with only a few of whom he advanced to Paris, and was received by the entire French nation with unbounded enthusiasm, in March, 1815. The congress of the ancient governments now proclaimed him out of the law of nations, and armies were advanced to the French frontiers. In June, he defeated the Prussians and the English separately; but, at Waterloo, on the 18th, after a desperate battle with an allied army, under the Duke of Wellington, the Prussians were permitted, by the treachery of one of his generals, to attack his right flank and rear, under Blucher and Bulow, and the French army was, in consequence, dispersed. Napoleon then returned to Paris, and, being unsupported, or betrayed by certain public men, he determined to retreat to America; but, on going to Rochfort and finding it blockaded by English cruizers, he surrendered himself to *the liberality* of the Prince Regent of England. The British government now executed the original plan, and sent him to St. Helena, placing him under a partizan of the name of *Lowe*. Here he died in 1821, of a cancer in his stomach, in consequence of the mortifications to which he was subjected. Besides his undoubted talents as a military commander and statesman, he was not less remarkable for the energy of his compositions as a writer: but all this energy of character begat in him a severity of system which offended the pride of the old governments of Europe, and alienated the feelings of the friends of liberty. In 1804, too, he had taken on himself the title of emperor, and, in 1806, that of king of Italy. He also provided for his family by different kingdoms, making Joseph king of Spain; Louis king of Holland; Jerome king of Westphalia; Murat, who married his sister, king of Naples; and Bernadotte, who married his wife's daughter, king of Sweden. All this drew on him the envy and jealousy of mankind, under which he necessarily fell.

Beau NASH was an eccentric but clever master of the ceremonies at Bath, in the reign of George II.

James NAYLER was a quaker, who at first was a parliament soldier, and afterwards believed he was inspired; and, in this character, in 1657, he entered Bristol on an ass, as a second Christ. For this he was convicted of blasphemy, and sentenced to be several times whipped, branded, his tongue bored with a hot iron, to be imprisoned, and kept to hard labour. He died at liberty, in 1660.

NEARCHUS was an admiral of Alexander the Great, who conducted a fleet from the Persian Gulf, round Africa, to Greece.

NECKER, a French minister, in 1788 and 9, was a Genevese, and distinguished for his knowledge in finance. He was no courtier, and his dismissal from office was the immediate cause of the

destruction of the Bastile. He retired to Switzerland, and died in 1804.

Admiral Lord NELSON was born in 1758, and, in 1779, made post-captain. In 1793, he served under Lord Hood, at Toulon, &c.; in 1797, under Lord St. Vincent, in the battle of that name; in 1798, he gained the victory of Aboukir; in 1801, he attacked Copenhagen; and, in October, 1805, he was killed in the famous victory of Trafalgar.

Marshal NEY, the bravest of Napoleon's marshals, was born in 1769. He assisted in the various French victories; at Hohenlinden, in 1800; at Elchingen, at Friedland, and at Muskwa; but fell a sacrifice to the changes of government, in 1815, and was shot in December of that year, while the Duke of Wellington commanded in Paris, under a treaty which assured general amnesty to all.

Sir Isaac NEWTON was born at Woolstrope, near Grantham, in 1642, and educated at Cambridge, where, in 1669, he became professor of mathematics. In 1672 he published his theory of light; in 1676 his method of fluxions; and, in 1687, his Principia, or mathematical system of physics. In 1699 he was made Master of the Mint. He was patronized by Lord Halifax, and by the Princess Caroline; and at his death, in March, 1726, had a public funeral in Westminster Abbey. He wrote 400 unpublished MS. sheets, chiefly on theological subjects, and also published on the prophecies of Daniel and St. John, likewise a work on chronology. He was many years president of the Royal Society. Newton avowed his object to have been the proof of the existence of God, which he deemed necessary to his miraculous powers of attraction, repulsion, gravitation, *vis inertiæ*, and projectile force, with which he clothed matter and the planets. He rejected the law of continuity, and considered those powers as restoring lost motion. Such is the effect of fashion, that Newton, who, in the reign of Anne, and George I. and II., was revered as a demi-god, is now abandoned in almost every branch of science. His fluxions have been superceded by differentials; his optics by the discoveries of Young, Malus, and Brewster; the physical powers which he adopted from Hooke, are explained away by some, or totally discarded by others; while his chronological theories have long been discarded as a series of mistakes.

NIMROD, or Belus, founded the Assyrian empire, and built Babylon, reigning 65 years. Ninus, his son, built Nineveh, and Semiramis, his wife, reigned after him, and Ninyas, or Zames, succeeded her, in all, 37, in succession to Sardanapolus, in 1300 years. This last was burnt in his palace by Arbaces, in 876 B. C.

NOAH, son of Lamech, and brother of Jubal, Jabal, and Tubal Cain, the fathers of arts which the Greeks ascribed to Apollo, Pan, and Vulcan; but, as Noah only was saved in the Ark, his younger brothers must have perished in the flood, though their arts survived. See Genesis, ch. iv. ver. 20, 22, and 31. and ch. v. ver. 28, and 29. This flood, according to Jerome's Vulgate, took place 2348 B. C. but, according to the Septuagint, about 860 or 900 years earlier.

Lord NORTH, prime-minister of England from 1773 till 1782, was born 1732, and died Earl of Guilford, in 1792. He was minister during the American war, and too supple a courtier. The family were long distinguished as writers and politicians. Francis, Lord Guilford, was Lord Keeper under Charles II. and James II.

NOSTRADAMUS was a noted astrologer and prophetical impostor, much honoured in France in the 16th century.

Dr. NOTT, of Bristol, was born in 1751, and died in 1826, after publishing some elegant and tasteful books.

NIZAM, Ul Mulk, was Vizier to the Sultan Alp Arslan, and to his son, and was the model of a good statesman, as well as author of some interesting books. He was stabbed in his 90th year.

Titus OATES was a tool of parties in the infamous reign of Charles II. and became an informer, by whose false accusations several eminent persons were executed, for which he got a pension of 1,200*l.* per annum, and other distinctions; but, in 1686, his perjaries were detected, and he was whipped from Aldgate to Newgate, and from Newgate to Tyburn; but, at the revolution, he was regarded as a martyr, and recovered his pension, but died infamous, in 1705.

OCELLUS, Lucanus, a Greek philosopher, of the fifth century, B. C. His book on the Universe is still extant.

Sir John OLDCASTLE, afterwards Lord Cobham, favoured Wickliffe, for which the clergy persecuted him by false accusations, and at length caused him to be burnt alive, at the place of execution, then Tottenham court-road, in 1417.

Omar, the second Caliph, ate barley-bread, or dates, and drank water, and his robe was worn in several places. He kindled his own fire, milked the ewes, and mended his shoes and gar-

ments. He fed multitudes, and lavished gifts on his adherents. He allowed Abbas, Mahomet's uncle, 25,000 pieces of silver per annum; 5,000 to those who fought in the battle of Beder, and 3,000 to the last of Mahomet's personal followers: in his reign of ten years, he or his generals captured 36,000 cities or castles, demolished 4000 churches and temples, and built 1400 mosques.

ORIGEN was a father of the church, born 185, and died in 254, at Tyre. His works make 4 vols. folio.

ORLEANS has given the title of duke to several men, eminent in French history. The first figured in the reigns of Louis XIII. and XIV. The second, his son, married the sister of Charles II. and died in 1701. The third was Regent, in the minority of Louis XV., and a man of taste, who died in 1723. The fourth was a religieuse, and died 1752. His grandson was Philip, who directed his fortunes to the reformation of the court, and fell a sacrifice to the fury of factions in 1793. His character has been variously represented, but he was a man of talent. As an assurance of his attachment to the republican cause, he took the name of *Egalité*, and voted for the death of Louis XVI., but he made these sacrifices to jealous demagogues in vain. His son, Louis Philippe, became King in July, 1830.

ORPHEUS, genius of the heroic ages, who wrote poetry, and improved music.

OSYMONDYAS was a king of Egypt, who reigned 3000 years B. C. He is supposed to have been the same as Memnon; and to him is ascribed many of the colossal structures in Egypt.

OSSIAN, an Irish poet, was son of Fingal, a Gaelic chief. His poems are recited traditionally by the Highland and Irish peasantry, and were collected and revised by Macpherson, in 1762. Of their antiquity there can be no reasonable doubt, and proofs are afforded throughout Ireland, and the western parts of Scotland. The name of Ossian also occurs in the contemporary writings of the Welsh bards.

There were two OSTADES, Dutch painters, and brothers; and the works of the elder, Adrian, sell for a great price. He died in 1685.

OSWALD, John, a Scottish gentleman, who, having resided among the Brahmins, wrote a very interesting tract, called the *Cry of Nature*, and some other works. His zeal in the cause of the French republic led him to accept a commission as colonel, and he and his two sons were killed in a battle in La Vendee.

OTWAY, author of the Orphan, Venice Preserved, &c. was born in 1651, and died neglected and miserable in 1685.

OVID, a vivacious Latin poet, who flourished in the Christian era, and died A. D. 17, in banishment.

Thomas PAINE, a political writer during the American Revolution, wrote Common Sense, and other tracts. Afterwards, in his native country, he wrote the Rights of Man, and other pamphlets. Being elected into the French Convention, in 1792, he wrote, at Paris, his Age of Reason, against the credibility of the Old and New Testament. He died at the age of 74, in New York.

PAISIELLO, a celebrated musician, born in 1741, and died in 1816.

Archdeacon PALEY, a tasteful and industrious English writer, was born in 1743, and died in 1805, having produced Elements of Moral and Political Philosophy, a work on Natural Theology, &c. &c.

PALLADIO, a classical Italian architect, was born in 1518, and died in 1580; having published some very considerable works on Architecture.

PANCKOUCKE, a Paris Bookseller, who died in 1798, was proprietor of the *Mercure de France*, the most extensively circulated periodical work ever printed. He then established the *Moniteur*, which, above 40 years, has been the official paper of the French government; and he commenced the publication of the famous *Encyclopedie Methodique*, the most extensive and able work of the kind.

PANTHERA, the name of the Roman soldier, whom Celsus, and certain Roman and Jewish writers, assert was the father of Jesus, after Mary's separation from her husband.

General PAOLI was a patriot Corsican. He defended his country against the oppressions of the Genoese, who, being baffled, made over their claims to the French government, against whom he also defended Corsica; but being overpowered, he and his friends fled to England, in 1769, and died in London, in 1807.

PARACELSUS, an eminent philosopher in a superstitious age. He was born in 1493. He settled at Basil, and pretended to have intercourse with spirits, and to possess the philosopher's stone, and elixir of life. He died in his 48th year, leaving works which make 11 vols. quarto.

PAPIN, inventor of the digestor, and author of some works on natural philosophy, was born in France, and died in Germany, in 1694. He was the first

who made experiments on the power of steam.

PARKINSON, author of the Herbal, was born in 1567, and died in 1640.

Archbishop PARKER, in the reign of Elizabeth, deserves to be memorable for the care with which he preserved the libraries and manuscripts of the religious houses at the Reformation, of which Benet College enjoys the advantage. He was born in 1504, and died in 1576.

PARMEGIANO, a famous painter, was born at Parma, in 1503. His works are of the first order of merit.

Dr. Samuel PARR was born in 1747, and was distinguished by his Greek learning, and his liberal and patriotic opinions. He died in 1825.

Thomas PARR was a remarkable instance of longevity; at the age of 100 he was charged with bastardy, and at 120 he married a widow. He died at 152 years and 9 months, in 1635, and his grandson lived to be 120. Henry Jenkins, a Yorkshireman, lived to be 169, and the Countess of Desmond to 142.

PASCAL, a very erudite French philosopher, born in 1623. Before he was 30 he made many important discoveries, but be was fanatical on religious subjects. His provincial letters are a specimen of acute logic, and refined wit. Soon after he became hypochondriacal, and composed "his thoughts." He died in 1662.

St. PATRICK, in the fifth century, introduced christianity into Ireland, and died March 17, 493.

Father PAUL, a man whose name figured in the 16th century, was born at Venice, in 1552. He wrote the History of the Council of Trent, and some philosophical works, in which he partly anticipated Harvey's doctrine of the circulation of the blood. He died in 1662.

Spencer PERCIVAL, an English prime-minister, who being employed in 1806, as counsellor to the Princess of Wales, became possessed of facts so interesting to George III. that, to prevent his publishing them, the King yielded to his terms, turned out the administration, and put Percival and his friends in their places. He was shot by Bellingham, in 1812.

PERICLES, an Athenian, was born about the year 500 B. C. and his eloquence soon gave him popular influence. He married the famous Aspasia. By his public spirit and his talents, he ruled Athens as a sovereign, without the name, and purchased the public homage, by building the Parthenon and Odeum, and by patronizing Phidias and others. He died 429.

The two PENNS made a considerable figure in the 17th century. Sir William, the father, was an admiral, who was sent by Cromwell to take Hispaniola, but failing, he made himself master of Jamaica. His son, born in 1644, was educated at Oxford, and joining the non-conformists, his father sent him abroad, but, in 1666, he came home, and falling among the quakers, he embraced their tenets; and his father, in 1668, got him committed to the tower for preaching against the Established Church. His maxim was, *No cross, no crown*, and he began to preach in the streets, for which he and his companion, William Mead, were prosecuted and imprisoned. His father dying soon after, and large debts being due to him from the Crown, Penn accepted, in lieu of these, the grant of a tract of land, south of New York. In 1681 he sailed with a band of quakers to colonize it. On landing, he entered into a treaty with the Indians, and laid the foundation of Philadelphia, calling the country Pennsylvania. He abolished slavery, and established an excellent code of laws. He died in 1718, in Berkshire.

Thomas PENNANT, a man of fortune, and an industrious writer, was born in 1726, and educated at Oxford. He published, on every branch of Natural History, many valuable works, and also some tours and topographies. He died in 1798.

The four brothers PERRAULT were a remarkable instance of quadruple genius in one family; Claude, the elder, born in 1613, built the Louvre. Charles, the second, held important situations under Colbert, and wrote many valuable works. Peter and Nicholas also wrote books of reputation.

PETER the Great, Czar of Muscovy, was born in 1672. In 1697, he made the tour of Europe, and at Sardam, in Holland, wrought as a shipwright, sending to Russia, from that country and England, the bestartizans he could procure. In 1709, he totally defeated Charles XII. at Pultowa, and in that war obtained possession of those provinces of which Petersburg is the centre. In 1716 he made another tour, and in 1723 he made war on Persia, and acquired some Provinces. In 1725 he died, being succeeded by his widow, Catherine I., who had lived in the capacity of menial servant in Prussia, and had been taken prisoner by the Russian army.

PETRARCH, Francis, was born in 1306, in Tuscany. At 27, he fell in love with Laura Sade at Avignon, and this incident tinged his whole life. She was, however, engaged or married, but

he settled near her at Vaucluse; and here he wrote his sonnets to Laura, and different works, which raised him to a pinnacle of cotemporary fame. In 1348 Laura died of a plague, which then prevailed throughout Europe. Petrarch lived till July, 1374.

Sir William PETTY was the son of a clothier at Rumsey, and born in 1623. In 1649, he graduated as a physician, at Oxford. He was one of the first fellows of the Royal Society, and one of the first writers on political economy. He died in 1687.

PHIDIAS, the celebrated Athenian sculptor, who enjoyed the advantage of being patronised by Pericles. He carved two statues in ivory, 90 feet high; and the best ancient works are ascribed to him.

PHILIBERT, Prince of Orange, commanded the imperial army at the taking of Rome, for Charles V. in 1527. He was killed in 1530. William, his cousin, succeeded him, and was elected head of the Dutch, in their resistance to Spain, under Philip II. He was assassinated in 1584. Maurice, his son, established the independence of the Dutch States, and usurped the government, but died in 1625. His grandson was our William III., and the same family are now Kings of the Netherlands.

PHILO Judeus, a learned Jew, flourished about the time of the Christian Era, and wrote various learned works and commentaries.

PICHEGRU, a French revolutionary general, was born in 1761. In 1794, he had the command of the army of the north, defeated the Duke of York, and the Duke of Saxe Coburg, and pursuing them across the Rhine, overran Holland, and entered Amsterdam, in January, 1795. But, in September, 1797, he and 65 deputies, and two directors, were transported to Cayenne, and making his escape, he emigrated. In 1804 he returned, but was arrested, and in a few days found dead in his prison.

PICUS, Mirandola, a miracle of learning in the 15th century, was familiar with twenty-two languages, and master of all the science of his time. He visited Universities, to challenge professors, but died at Florence, in 1496, aged 33.

PILPAY, an oriental philosopher, wrote his apologues about 2000 B. C.

PINDAR, the Greek lyric poet, flourished about 500 B. C.

William PITT, Earl of Chatham, was born in 1708. In 1735, he became M.P., and joined the party of Frederick, Prince of Wales. In 1744, the Duchess of Marlborough left him 10,000*l*., and, in 1746, he became a placeman; and, according to the vacillation of parties, was in and out of office till 1768. In 1778 he died, in consequence of his exhaustion during a speech which he made in the House of Lords, against the American war. His second son was the equally celebrated William Pitt, who was born May 28, 1759: he was educated at Cambridge and Rheims, and, in 1780, became M. P., taking the side of the Reformers. In 1782, he was made Chancellor of the Exchequer, and, in 1783, in his 24th year, became Prime Minister; a station which he retained, in spite of the shocks of parties, till 1801, and then resigned. In 1804 he became Minister again, and died in January, 1806.

PIZARRO, a Spanish freebooter, was born about 1500, and, in 1525, he and some other adventurers invaded the peaceful kingdom of Peru, and taking Ataliba, the Inca, prisoner, they forced him to profess Christianity, and then burnt him; but, as a favour to a Christian, strangled him first. Soon after, this banditti quarrelled among themselves, and Pizarro's brother strangled Almagro, the second in command, but, in 1451, the son of Almagro killed Pizarro at Lima.

PIUS VI., the last Pope but one, succeeded Clement XIV. in 1775; the French revolution deprived him, in 1791, of Avignon and its territory; and in consequence, in January, 1793, the French Ambassador was murdered by the Roman populace, and no satisfaction obtained. In 1796 and 7, the French marched on Rome, and entered into treaty; but soon after the Roman populace murdered general Duphot, attached to the French embassy. The French army now entered Rome under Berthier, and the Roman republic was re-established, and the Pope was conveyed a prisoner to France, where he died in March, 1800. A new Pope was elected, and, in 1804, he crowned Napoleon as Emperor; but, in 1809, Napoleon anited the Pope's territories to the French empire, and kept the Pope at Fontainbleau, till his resignation in 1814, when the Pope returned to Rome, and died in 1823. He was succeeded by the last Pope, Leo XII., who died in 1831.

PLATO, the most renowned of the Greek philosophers, was born 430 B. C. He studied under Socrates, and on the murder of that philosopher, went into Italy, and studied in the schools of Pythagoras, and afterwards visited Egypt. He then opened, at Athens, a school called the Academy, and among his pupils were Aristotle, Lycurgus, and Demosthenes; while Socrates,

Xenophon, and Diogenes, were among his opponents. There he taught philosophy till his 79th year, and died in 348. Statues and altars were erected to his memory, and the day of his birth kept as a festival. His works are in 12 volumes, and there is an English edition by Taylor, in 5 quartos. Plato taught three principles; the cause or mover, matter and form; or two, the cause and matter. He was, in other respects, of the school of Pythagoras and Parmenides. The Academical Philosophy is so called from Plato's place of teaching, a grove of one Hecademus, bequeathed for gymnastic exercises.

John PLAYFAIR, Edinburgh Professor of Mathematics, was born in 1748, and was in many respects one of the most active and original natural philosophers of his age. He died in 1819.

There were two PLINYS, uncle and nephew, or elder and younger. The first was born A. D. 22, at Verona, and he wrote a history of his own time, and a Natural History, which last is still extant. He lost his life by his curiosity in ascending Mount Vesuvius, during an eruption.—Pliny the younger died A. D. 103, and there remain his letters, and his panegyric on Trajan.

PLUTARCH, the biographer and historian, was born in 50 A. C., and, after extensive travelling, he settled at Rome, where he taught philosophy, and was promoted by Trajan. He died in 119.

POMFRET, the author of the Choice, &c. was born in 1667, and died of the small-pox, in 1703.

Madame POMPADOUR, famous as the mistress of Louis XV. She was born in 1722, and in 1745 was created marchioness. She promoted literature and the fine arts; had a pension of 10,000*l.* per annum, and the office of lady of the palace to the Queen. She influenced every thing, even war and peace, and died in 1764.

POPE, Alexander, the prince of English poets, was born in Lombard-street, in 1688. His father being a linen-draper, and a catholic, his education was liberal, chiefly under Romish priests. He became an author at 12, and published his principal works between 1705 and 1742. He died May 30, 1744. He was small and deformed in person, with a very delicate constitution; but his transcendant genius rendered him the spoiled child of the age in which he lived.

PORPHYRY, a distinguished writer, was born at Tyre, in 233. He wrote against the use of animal food, the Life of Pythagoras and Plotinus, together with some very strong Tracts against the Christian religion. He died about 304.

Richard PORSON, celebrated for his memory, learning, and eccentricity, was born in 1759, and died in 1808.

Baptista Della PORTA, an active philosopher, in a superstitious age, was born at Naples, in 1445. He invented the camera-obscura, a near approach to the telescope, and published some highly-curious works. He died in 1515.

PORTEUS, bishop of London, and son of the captain Porteus whose name is connected with the history of Edinburgh, was born at York, in 1731. In 1759 he wrote his fine poem on Death, and, in 1787, was made bishop of London. He died in 1808.

POLYBIUS, a Greek classic historian, was born 203 B. C. He wrote a Universal History, during 135 years, in 12 books, of which only five are now complete. He died in his 82d year.

Charles PRATT, the first Earl Camden, and many years Chief Justice of the Common Pleas, was born in 1713, and died in 1794, after a life distinguished by the independent exertion of sound principles.

The Abbé PREVOST, the most fertile of modern writers, was born 1697, and his works and compilations extend to 156 volumes; he also translated the novels of Richardson. In November, 1763, he fell down, in an apoplectic fit, in the forest of Chantilly, when an ignorant magistrate ordered a surgeon to open his body; on which he started with pain, but not before he had received mortal wounds.

Dr. Richard PRICE, a learned Dissenter, was born in 1723. He officiated to a dissenting congregation at Hackney, established the Equitable Assurance Company, suggested the Sinking-Fund scheme, and wrote some political tracts, dying in 1791.

Dr. Joseph PRIESTLEY was born in 1733. In 1761, he became tutor in the college at Warrington, and there wrote several works, after which he resided six years at Leeds, and discovered the composition of air. In 1773 he became librarian to Lord Shelborne, and his discoveries in air produced him great distinction. In 1778, he removed to Birmingham, and there wrote his History of the Corruptions of Christianity, and other works. But, in 1791, a church-and-king mob burnt his house and library, and he removed, first to Hackney and afterwards to Pennsylvania, where he died, in 1804.

There were two POUSSINS, French painters; Nicholas, the principal, who was born in 1594 and died in 1665, and Gasper, his brother-in-law, who was born in 1600, and died in 1675.

POTTER, Archbishop of Canterbury, and author of several learned works, was born in 1674, and died in 1747.

Henry PURCELL, the English musical composer, was born in 1658, and died in 1695. His Te Deum Jubilate, Orpheus, Brittanicus, and King Arthur, were his principal works.

PTOLEMY, the astronomer, was born in Egypt, in 70 A. C. His works convey the best notions of the state of ancient science. He died about 150.

PYTHAGORAS, the earliest Greek philosopher, was born about the year 600, and lived to be fourscore. The fables about him render him almost an ideal personage. He was born at Sidon and educated at Samos; he then passed 25 years in Egypt, and visited India. He taught the doctrine of transmigration and abstinence from animal food. He was the inventor of the multiplication table, and a great improver of geometry, while in astronomy he taught the system adopted at this day. He also discovered the diatonic scale in music. He enjoyed five years retired study to his disciples.

PYRRHUS reigned in Epirus about 300 B. C., and, in 280 B C. invaded Italy, and again in 270; but, at length, he was killed at Argos.

PYRRHO, a Greek philosopher, who accompanied Alexander the Great, and, imbibing the eastern philosophy, founded a sect, and died 288 B. C.

QUINTILIAN, a Roman classic, was born about 42. He disgraced his learning by praising Domitian, and died in 122.

RABELAIS, a distinguished French writer, was born in 1483, and died in 1553.

RACINE, the French Dramatist, was born in 1639, and died in 1699. His works were numerous, and are still performed.

RAMEAU, a celebrated French composer, and illustrator of the science of music, was born in 1683, and died in 1754.

Allan RAMSAY, the Scottish poet, was born in 1685, and, in 1721, he published his poems, and soon after his Gentle Shepherd. He died in 1758.

RAPIN, the French historian of England, was born in 1661; he began his history in 1707, and lived to complete eight volumes, quarto, to the death of Charles I. Two other volumes, to the Revolution, were published from his manuscripts, in 1726, the year after his death.

Sir Walter RALEIGH was born in 1552, and served in the English army in Ireland. He afterwards, in 1584, founded the first settlement in Virginia, calling it after Queen Elizabeth, and, on his return to Europe, brought with him tobacco and potatoes, which he planted on his estates near Cork. He was employed in many other public services, and was in personal favour with Queen Elizabeth. Not being fancied by the new Scotch interest at court, he was charged with being privy to a conspiracy, for placing Arabella Stewart on the throne. The indictment was for misprision of treason, but a base jury found him guilty of treason. In consequence, Sir Walter was imprisoned twelve years in the tower, during which he wrote his History of the World. Bribing Villiers, he obtained the command of an expedition to Goyana, but, on his return in July, 1618, was arrested, at the instigation of the Spanish ambassador, for attacking a Spanish settlement, and ordered to be executed under the former verdict for treason, obtained sixteen years before, at which time Bacon was Lord Keeper, and in full power. This legal murder of the greatest man of his age took place October 29, 1618.

RAPHAEL, commonly called the Prince of painters, was born at Urbino, in 1483. The Popes Pius II. and Leo X. patronized him, also a rich banker of the name of Chigi. The number, the splendour, and the astonishing genius of his works, created a sort of idolatry for his person, but he fell in love with a baker's daughter, and his excesses caused his premature death, in 1520. No less than 740 of his designs have been engraved, and many of his pictures sell at the price of an estate.

The Abbé RAYNAL, an original French writer, was born in 1718. In 1770, he published his History of the East and West Indies. During the revolution, he wrote some pamphlets, and died in 1794.

RAYHIB Pacha, an able Turkish vizier, from 1757 to 1768, when he died distinguished as a politician and writer.

REAUMER, a distinguished French naturalist, was born in 1683, and after making many discoveries, inventing a thermometer, and publishing a great work on the history of Insects, he died in 1757.

REMBRANDT, the most powerful of the Dutch painters, was born in 1606, and died in 1674.

Sir Joshua REYNOLDS, first president of the Royal Academy, and Founder of the English school of painting, was born in 1723, and died in 1792. The R. A. was established in 1769, and his annual discourses are deservedly admired.

RICHARD I. king of England, was the second son of Henry II. and born in 1157. His youth was marked by the basest conduct to his father, whose heart he broke. This seems to have qualified him for a crusader, and in 1190 he sailed with a vast army, accompanied by Philip, king of France, for the Holy Land. They took Acre, and obtained some other successes against Saladin. The intrigues of his brother John forced him to return in 1192, and while traversing Austria as a pilgrim, he was seized and imprisoned, while his brother John, and Philip king of France connived at it. In 1194, he procured 150,000 marks for his ransom, and returned to England, and soon after entered into a contest with a vassal, Lord of Chalus, and was shot by an arrow during the siege, in April 1199. His ferocious bravery led to his being called *Cœur de Lion*.

RICHARD II. was son of Edward the Black Prince, and grandson of Edward III. whom he succeeded in 1377, in his eleventh year. Spoiled by power and education, the tyranny of his government drove the people to general insurrections; one of which was headed by Wat Tyler, and caused the loss of some thousand lives, and the destruction of immense property. His success, in quelling these, so intoxicated him, that he became as profuse as some of the Roman Cæsars; and, after murdering one of his uncles, Henry, son of John of Gaunt, headed the nation, and Richard was formally deposed in 1399. He was then imprisoned at Pontefract, and soon after put to death.

RICHARD III. was youngest son of the Duke of York, who was killed in the battle of Wakefield, and born in 1450. He was educated amidst the slaughters which attended the wars between the Houses of York and Lancaster. He was 21 at the battle of Tewksbury, which ruined the House of Lancaster, an age at which he was not likely to have committed the murders ascribed to him. On the death of his brother in 1483, he sacrificed his friends and seized his children, procuring himself to be proclaimed king. Whether he killed the young princes, or whether he sent them abroad, and they were the Perkin Warbec, and Lambert Simmell of Henry the Seventh's reign, is now uncertain. After sacrificing his creature Buckingham, the crown was claimed by Henry Earl of Richmond, descended from John of Gaunt, who met him at Bosworth, with a superior force, and Richard was defeated and killed, August 23, 1485.

Samuel RICHARDSON, author of Pamela, Clarissa, and Grandison, was a respectable printer in London, and died in 1761, aged 72. He was the founder of the prolific school of domestic novelists.

Cardinal RICHELIEU was born in 1585; in 1614 he was made Secretary of State; in 1622 he was created Cardinal; and, in 1624, became prime-minister to Louis XIII. He persecuted the Protestants, and governed France till his death, in 1642. Marshal Richelieu, of the same family, was born in 1696, and held commands in the wars of Louis XV. He died in 1788. The last distinguished person of the family was the Duke de Richelieu, born in 1767, who, after organizing Odessa for the Emperor of Russia, became prime-minister to Louis XVIII. and died in 1822.

Bishop RIDLEY was educated at Cambridge, and made bishop of London in 1551. He was so zealous a friend of the reformation, that, on the accession of Mary, he was convicted as a heretic, and burnt with Latimer, at Oxford, on the 15th of October, 1555. Being consulted by Edward VI. on his death-bed, in regard to the best disposition of charitable funds, he planned for the young King the *four* grand hospitals—of Christ's for education, of Bridewell for industry and distress, of St. Bartholomew and St. Thomas, for the sick and maimed.

RIENZI, a Roman of Plebeian birth, who was fired with enthusiasm to restore the ancient Roman republic. In this design he acquired considerable power, and the Pope residing at that time at Avignon, his success was obstructed only by his extravagances, and he was killed in 1354.

Joseph RITSON, an English antiquary and philologist, in which he displayed great accuracy of learning and research. He also wrote against the use of animal food. He died in a derangement of fever, caused by erysipelas, in 1803.

David RIZZIO was an Italian musician, and great talents as a linguist, who going to Scotland in the suit of the ambassador from Savoy, became a great favourite with the young Queen, Mary, which exciting the jealousy of her husband, Darnley, he and his partizans assassinated Rizzio, in the queen's presence, in 1566.

Robert BRUCE, King of Scotland, the opponent of the Baliol interest, asserted his claims in 1306, and having gained the battle of Bannockburn over that weak prince, Edward II., he remained King of Scotland, and died aged 54, in 1329.

William ROBERTSON, the Scottish historian, was born in 1721. He wrote a history of Queen Mary and her son,

of Charles V., and of America; also a disquisition on India, and died in 1793.

ROBESPIERRE, one of the most inexorable politicians recorded in history. He was born at Arras, in 1759, brought up as an advocate and enjoyed an excellent character till he became a politician, and obtained ascendancy. He was a member of the National Assembly; and, in May, 1791, proposed a law to abolish capital punishments. In 1792 he was the leader of the Jacobin Club, and, through the year 1793, he, his brother, and their friends, controlled the committees of government, during which period France was deluged with blood. Self-defence led to attacks on Robespierre, and he and his party were guillotined July 28, 1794. After his death, his entire property appeared not to be worth five pounds sterling.

ROBIN HOOD was the head of the free foresters; who, in spite of royal claims, ranged the forests from Nottingham to Barnsley, in the reigns of Richard and John, for a period of 30 years; having a well-trained band of powerful archers in his command. He was long outlawed, and great rewards offered for his apprehension; but, falling ill, he applied to the prioress of Kirklees to bleed him, and she bled him to death. The popular ballads recording his story, have become traditional in the districts once the great northern forest.

Mary ROBINSON, commonly called the British Sappho, and as celebrated for her beauty as her talents, was born at Bristol, in 1758. An indiscreet marriage, in her 15th year, obliged her to resort to the stage, where the Prince of Wales, then 18, and the handsomest man of his age, fell in love with her, and withdrew her from the uncertain protection of her husband; but she experienced the fickleness of princes, and was soon left, with a pension of 400*l.* a-year. Soon after, in her 22d year, a fever deprived her of the use of her knee-joints, and she devoted herself to literature, and produced many works in verse and prose. She died in 1801.

Admiral Lord RODNEY was born in 1717; in 1759, he bombarded Havre; in 1761 he took Martinique; and, in 1768, he was ruined by a contested election at Northampton. In 1780, he defeated a Spanish fleet off Cape St. Vincent; in 1781, he took St. Eustatia; and, on the 12th of April, 1782, defeated the French under De Grasse. He died in 1792.

Madame ROLAND, a woman of extraordinary talents. At 22 she married M. Roland, afterwards a very able and virtuous minister of state. She took an active part in favour of liberty during the revolution; and, on an accusation being passed against her husband, she presented herself before the Convention, and demanded to be heard in his defence; for which she was arrested, put on a mock trial, and guillotined Nov. 1, 1793. Her husband, on hearing of her death, stabbed himself.

ROLLIN, a tasteful French writer, was born in 1661, and, in 1687, made professor of eloquence in the Royal College of France. He died in 1741.

Sir George ROOKE, a famous English admiral, was born in 1650, and, in 1702, he defeated the combined fleets in Vigo Bay. In 1704, he captured Gibraltar, and died in 1709.

Salvator ROSA, a Neapolitan painter, of great original genius, was born in 1615, and died 1673.

Jean Jaques ROUSSEAU, an eccentric but eloquent French writer, was born at Geneva, in 1712, where his father was a watch-maker. He became a music-master, and afterwards lived by copying music. In 1752 he wrote a comedy and a musical entertainment; and, in 1762, his Julia, or the new Heloise, afterwards the Social Contract, a book on education, a comedy called Pygmalion, &c. &c. In all 17 volumes quarto. He died in 1778, little esteemed as a man, but extremely popular as a writer.

ROWE, Nicholas, an eminent dramatist, was born in 1673. At 24 he produced the Ambitious Step-Mother, then Tamerlane, The Fair Penitent, Jane Shore, Lady Jane Grey, besides a translation of Lucan. He died in 1718.

Mrs. ROWE, cotemporary with the preceding, but no relation, was daughter of a dissenting minister, and born in 1674. In 1700, she married Mr. Thomas Rowe, the son of another dissenting minister. She wrote *Friendship in Death, Devout Exercises, The History of Joseph*, a poem, and other works; and died in 1737.

RUBENS, the illustrious painter, was born in 1577, and studied his art in Italy. On his return, he was employed and courted, for many years, by all the sovereigns in Europe. His works are so numerous, without being less perfect, that more than 300 of them have been engraved. He died in 1640.

Count RUMFORD, whose family-name was Thomson, and native country New England, was born in 1752. After the war of independence, in which he was a loyalist, he entered into the service of the King of Bavaria, and reformed many establishments in that country. In 1799, he published his experiments on Heat, and planned the Royal Institution. In 1802 he settled at Paris, married the widow of Lavoisier, and died in 1814.

Lord William RUSSELL, known as a patriot, was the third son of the fifth Earl of Bedford, and born in 1641. He was member for Bedfordshire in four Parliaments, and 1679 was made one of the privy-council; but in 1680 he went to Westminster Hall, and presented the Duke of York as a popish recusant, and also carried up the exclusion bill, at the head of 200 members, to the House of Peers. He was in consequence imprisoned, on the ridiculous Ryehouse plot, for which he was tried before Jefferies, and a packed jury, and convicted and executed.

Admiral RUSSELL, Earl of Orford, was born in 1651. In 1692 he gained the victory of La Hogue. He died in 1727.

SABATIA, Sevi, was a Jewish impostor, who, in the 17th century, announced himself as the Messiah, in Turkey, being followed by multitudes. He was taken before the sultan, to whom he declared his power of working miracles. The sultan, then ordered him to be tied to a post and fired at, challenging his power; when Sabatia confessed his imposture, and turned Mahometan.

Dr. SACHEVEREL, a theological politician, created a great flame in the reign of Queen Ann, by preaching two sermons about the danger of the Church from the Dissenters, for which he was prosecuted by the House of Commons, a circumstance which rendered him the most popular man of his time. He died in 1724.

There were two SACKVILLES, Earls of Dorset, both very accomplished; one Thomas, born in 1537, and favoured by Elizabeth, who died in 1608, author of various poems, and a tragedy. The other, Charles, was born in 1637, at once a polite writer and a friend of Milton, Butler, Prior, Dryden, Congreve, and Addison. He died in 1706, and his son was created Duke of Dorset. The family-seat, Knoll, exemplifies his taste in his fine collection of portraits.

SADI, the Persian poet, according to the oriental legend, went forty pilgrimages to Mecca on foot from Shiraz, and studied for 30 years, travelled for 30 years, and passed 30 years in devotion. He was taken prisoner by the Crusaders, and died in 1296, nearly 100. His chiefly poems are the *Garden of Roses*, and the *Garden of Fruits*.

SALADIN, the Sultan of Egypt and Syria. He was opposed to the Christian fanatics in Palestine, and excited by their massacre of pilgrims going to Mecca. His first victory was at Tiberius, in 1187, where he cut down Guy de Lusignan with his own scimitar, and many more Christian chieftains, and among others Chatillan, the author of the massacre. He then took Acre and Jerusalem, but was opposed by Richard Cœur de Lion, with whom he made a truce, and died in 1193.

SALLUST, the Roman historian, born 55 B. C. and died 35 B. C.

SANCHONIATHON, the early Phœnician historian, flourished about the year 1100 B. C. Only fragments and extracts of his works now exist.

SAPPHO, the Thespian poetess, flourished in the 5th century B. C.

Professor SAUNDERSON, of Cambridge, is famous as a blind man who taught mathematics, and was among the ablest of his age. He died in 1739, aged 57.

SATURN, King of Crete about 1450 B. C., in whose reign iron was discovered, by the burning of the woods on Mount Ida. In 1300, the sixth planet was named after him, and, in consequence, astrology in time deified him in connection with this planet. He was the father of Jupiter, and so superstitious as to endeavour to destroy his own son. The discovery of iron led the poets to call his the iron age.

George SAVILE, marquis of Halifax, and a noted statesman, was born in 1603, and filled various high stations in the government under the Stuarts, but he promoted the revolution. He died in 1695.

Marshal SAXE was the natural son of Augustus, King of Poland, and born in 1696. In 1744 he commanded at Dettingen, and in 1745 defeated the Duke of Cumberland at Fontenoy, and overran Flanders. He died in 1750.

There were two SCALIGERS, famous classics and critics. The father, Julius Cæsar, born 1484, near Verona, and died in 1558. His son, Joseph Justus, was born in 1540, and died in 1609. Their editions and notes on the classics are very numerous.

SCHILLER, the celebrated German dramatist, was born in 1759, and after writing the Robbers, Wallenstein, Fiesco, Cabal and Love, Don Carlos, and some historical works, he died in May, 1805.

Marshal SCHOMBERG, who was killed at the battle of the Boyne, had commanded French armies in Spain and the Netherlands; but being a Protestant, he left France on the revocation of the edict of Nantz, and coming to England with William III. was created a duke, and sent as commander in Ireland, where he was killed by a chance shot, July 1, 1690.

SCIPIO, Africanus, was the commander of the Roman forces in the first invasion of Africa, and he defeated Hannibal at Zama. After making peace,

was honoured with a triumph, but being assailed by party he retired from public life, and died 189, B. C. His brother, Lucius Cornelius, was surnamed Asiaticus, for his victory over Antiochus at Maguesia. There was also a third Scipio, who was the son of Paulus Æmilius, but adopted by the son of the first Scipio, and therefore took the name. He was the commander who destroyed Numantia, and who afterwards took, and, in so barbarous a manner, destroyed Carthage. He was found dead in his bed 129 B. C. in his 56th year. There was also a fourth Scipio, called Scipio Nasica, who was the son of Lucius Cornelius, and nephew of the first Scipio, and was a senator remarkable for his eloquence and probity. He vigourously opposed in the senate that stain on the Roman name, the destruction of Carthage, and died 100 B. C.

SCOTT, Sir Walter, a very ingenious and tasteful, though voluminous writer of Tales and Romantic Histories in verse and prose, adapted to the amusement of females and persons who in books seek mere pastime. He possessed neither the deep philosophy of Shakespeare, the satire of Swift, the sound reasoning of Pope, the humour of Fielding, the human sympathies of Richardson, or the wit and design of Voltaire; yet, by writing under the mystery of the Great Unknown, and by a commercial union with musical composers, dramatists, and journalists, he enjoyed in his day as unbounded a popularity as Lope de Vega. To gratify the court and aristocracy of England, he lent himself to their hostility to the only romantic hero of his own age, and his last acts were a public opposition to the Reform Bill, and a pamphlet against the party of the Reformers. With reference to knowledge and improvement, no man ever wrote so much to so little purpose. No original adage of morals, and no maxims of physical truth appear in his three or four score volumes. At the same time he invented and drew characters with masterly ingenuity, and strung incidents together with a charm which made most of his readers forget his superstitious machinery, and the miseries produced by the glare of war and chivalry. Seduced by the enormous profits which the unsated patronage of the world conferred on his works, he wore himself out, and died of mental and bodily exhaustion, in 1832, at the age of 61.

John SELDEN, a learned legal and political writer, was born in 1584, and died in 1654. He wrote on the ancient constitution of England, the history of tithes, a work on the Arundel marbles, an answer to Grotius on the Freedom of the Sea, and took part in the civil wars against Charles I.

SENECA, a wealthy Roman philosopher, who was tutor to Nero, and wrote some excellent moral and philosophical works, but being suspected by Nero, he was allowed to choose his death, and he was bled to death in a warm bath.

Edward SEYMOUR, Duke of Somerset, was brother of Lady Jane, third wife of Henry VIII., and therefore uncle of Edward the VIth.; to whom he was an able prime-minister, and also a zealous friend of the reformation. Jealousy created him enemies among the nobility, which led to his death on the scaffold, in 1552.

The SFORZAS were a distinguished family in Italy, whose founder, the son of a shoe-maker, becoming a soldier, so advanced himself as to become a general and a count, also constable of Naples, but he was drowned, in 1424. His natural son succeeded him, and became Duke of Milan, and dying in 1466, his descendants long enjoyed that sovereignty.

Michael SERVETUS, a literary Spaniard, was born in Arragon, in 1509. At 22 he wrote a Tract against the Trinity, and soon after graduated, at Paris, as a physician. He was the correspondent of Calvin, during the time of their mutual heresies, before Calvin fled to Switzerland; but afterwards, Servetus went a step further than Calvin, and, therefore, found in Calvin a bitter enemy. In 1553, he published a work, for which Calvin stirred up a prosecution, and obliged Servetus to leave Vienna for Naples; but, passing through Geneva, Calvin, who was all-powerful, procured him to be arrested, and he was, on the evidence of letters to Calvin, and of forced constructions of his works, sentenced to be burnt alive; a deed which was perpetrated on the 27th of October, 1553. Servetus gave the first idea of the circulation of the blood, and of the vital functions of respiration.

Madame DE SEVIGNE, the celebrated letter-writer, was born in 1626, and died in 1696.

There were two Lord SHAFTESBURYS; one, who was born 1621, and after filling various public employments, died in Jan. 1683. The other, and third earl, was his grandson, born in 1671, and died in 1713. He was the author of the Characteristics, and some other works.

William SHAKESPEARE, one of the most extraordinary geniuses that ever appeared in the world, was the son of an industrious wool-stapler, who had a large family, at Stratford-upon-Avon. Before he was 18 he married Aun

Hathaway, and, according to the custom of that part of the kingdom, where foresters' habits still prevailed, he engaged in deer-stealing, not upon a principle of thieving, but on a claim of natural right, asserted by the common people from all antiquity. Poaching, to the present day, is not considered by them as any crime, though contrary to law, and for the same reason. Being in danger of a prosecution, he fled to London; and, from the employment of holding horses at the door of the theatre, became first an actor and then an author. His first play was Hamlet, written about 1594, in his 30th year; his second, Romeo and Juliet; and these were followed, in 1596, by Richard the Second, and Richard the Third. He continued to write till about 1612, when he retired, and settled at Stratford, but died on the day he completed his 52d year, April 23d, 1616. He left three daughters, who died without children, but his sister Joan left a large family, who still live in the neighbourhood, without deriving any advantage from their descent.

Granville SHARPE, an amiable enthusiast, was born in 1734, and, in 1770, he had the glory of defending a Negro, whose slavery had been asserted in England, and he established the principle of law that there can be no slaves in England. He then headed a society to abolish the slave-trade, and, after 30 years unwearied labour, succeeded in his object.

Richard Brinsley SHERIDAN, was the son of Thomas Sheridan, a literary player and dramatist, and born in Dublin, October, 1751. He was educated at Harrow, and, before his 30th year, produced the Rivals, the Duenna, the School for Scandal, and the Critic. In 1780, he became M. P. for Stafford; and, from that time till his death, distinguished himself by displays of extraordinary talents as a senator, in which he always supported the liberties of the people with a distinterested zeal which has never been exceeded in ancient or modern times. Surviving his friends, he died neglected in 1816.

William SHIPPEN, a very eloquent patriotic member of the House of Commons, was born in 1672; and, after serving in many Parliaments, with zeal and great ability, he died in 1741.

Sir Philip SIDNEY, a chivalrous and accomplished hero of the age of Elizabeth, was born in 1554, and killed at Zutphen, in 1586.

Algernon SIDNEY, an English patriot, was born in 1617, and, joining the republicans, in the civil wars, he held various appointments, and was one of the High Court of Justice for trying Charles I. After the Restoration, he retired abroad; but, being permitted to return, in 1677, he was, on the following year, charged with being a party in the Rye-House-plot, and convicted, but on imperfect evidence. He was, in consequence, executed on Tower-Hill, December 7, 1678, leaving a much-honoured fame.

SILIUS ITALICUS was a Latin poet, whose work on the Punic War still exists. He died in 90 A. D.

Pope SIXTUS V., born in 1521, was not less remarkable for having kept swine in his boyhood, than for the talents which he displayed as Pope, from 1585 to 1590, when he died.

Sir Hans SLOANE, a distinguished naturalist, president of Phyicians College and the Royal Society, was born in Ireland, in 1660; and, after a voyage to the West Indies, settled in London, and acquired a large fortune as a physician. He was the chief founder of the British Museum, and also of the Botanical Garden at Chelsea, where he died, in 1752.

Dr. Adam SMITH, a noted Scotch writer, was born in 1723, and died in 1790. He wrote a work on moral sentiments, and another on the origin of languages, and a dissertation on the *Wealth of Nations*, which last work was useful as a speculation, but unhappily has laid the foundation of an impracticable practical science called Political Economy.

Dr. Tobias SMOLLET was born in 1721, and after going as a surgeon to the West Indies, he settled in London, as an author, and produced *Roderic Random*, *Peregrine Pickle*, *Humphrey Clinker*, his *History of England*, and other works. He died in 1771.

SOCINUS, founder of the Socinians, was born in 1539, in the Roman territory, which he quitted with his uncle on account of their peculiar opinions. They removed into Switzerland, Germany, and Poland. At Cracow the publication of his Unitarian doctrines occasioned his house to be destroyed by the mob, but having created a large party, he died in 1609.

SOCRATES was born 469 B. C., and was originally a statuary, but studying philosophy, he became so eminent for his wisdom, that, exciting the jealousy of the priesthood, he was sentenced to be poisoned, which took place 369 B. C.

SOCRATES and Archilaus made principles infinite, and ascribed generation and corruption to mixture and separation.

SOLON, a celebrated Athenian, was born in the sixth century B. C., and was archon in 594 B. C. and in that office he reformed the laws and remodelled the constitution, and died, aged 80, at Cyprus.

SOPHOCLES, the Greek tragic poet, was born 419 B. C., and died 407 B. C., only 7 of 100 of his tragedies have survived to our time. His morals may be judged by the following lines. The portrait of the just feelings of a good wife, by Sophocles, deserves to be known:—

Faithful—as dog, the lonely shepherd's pride,
True—as the helm, the bark's protecting guide,
Firm—as the shaft that props the towering dome,
Sweet—as to shipwreck'd seamen land and home,
Lovely—as child, a parent's sole delight,
Radiant—as morn that breaks a stormy night,
Grateful—as streams that in some deep recess,
With rills unhop'd the panting traveller bless.

JOHANNA SOUTHCOTT, a cunning impostor, born 1750, and died in 1814; though grossly iguorant, she fancied herself the woman of the Revelations, and gave seals to her disciples, and on having a disorder of the womb, she gave out that she was pregnant of Shiloh, and thousands became her frantic disciples.

SOSENES, of Alexandria, was the mathematical arranger of the calendar for Julius Cæsar. Pope Gregory XIII., in 1581, struck out 10 days gained by the odd minutes in leap-years, and in 1752, 11 days were dropt in England.

SPENSER, author of the *Faery Queen*, and other works, was born in 1553, and died in 1589.

SPINOSA, a learned Jew, was born at Amsterdam, in 1629. Having renounced the Jewish religion, he applied himself to philosophy; and after publishing various works, in which he maintained that God and nature were the same, he died in 1677.

Madame de **STAEL**, a popular modern writer, was the daughter of the famous Necker, and was born in 1766. Her husband was a Swedish Ambassador at Paris, and she soon distinguished herself by some political writings. After the revolution, she published her *Delphine*, *Corinne*, and other works, which were very popular, and she died in 1817.

STANISLAUS, the last King of Poland, was raised to that throne by Catharine II., as her personal male favourite. His authority was disturbed by a civil war between his Protestant and Catholic subjects, which, with the weakness of his government, led to the division of Poland between Russia, Austria, and Prussia, in 1773. Stanislaus died in 1798, at Petersburg.

Sir Richard **STEELE**, author of the Tatler, and joint writer of the Spectator and Guardian, and of many dramatic pieces, was born in 1671, and, after a life of great variety, died in 1729.

The **STEPHENS** were a family of learned printers, editors, and critics. Henry, the founder, was a printer at Paris, and died in 1520. His three sons Francis, Robert, and Charles, succeeded him; and Robert, born in 1503, acquired great celebrity, dying in 1550. It was he who divided the New Testament into verses, which he performed on horseback, while riding from Paris to Lyons. His son Henry, born in 1528, was still more celebrated as a man of learning, but he died in an alms-house, in 1598. His son Paul had a printing-office at Geneva, and was also a man of letters.

STERNE, the author of the *Sentimental Journey*, and of the admirable novel of *Tristam Shandy*, was a Yorkshire clergyman, born in 1713, and died in 1768.

The last of the **STUARTS** was Henry, Cardinal of York, born in 1725; who, on the death of his brother Charles Edward, in 1788, assumed the title of Henry IX., King of England; on the French driving him from Rome, George III. granted him a pension, which he enjoyed till his death in 1797. The son of James II. James Edward, called the old Pretender, was born in London, June, 1688, and, after various struggles to recover the throne of the family, he died in 1766.

There were two **STRABOS**, one a geographer, who lived in the first century, and the other a monk, who lived in the 9th century, a poet and prose writer.

Lord **STRAFFORD**, whose fate led to that of Charles I. was of a Yorkshire family. In 1593, he commenced his career as a zealous patriot, and was one of the chief promoters of the *Petition of Right*. On the death of his enemy Buckingham, he became a court favourite, and was made president of the North, and Lord Deputy of Ireland. For abuses of power, he was attained, and beheaded in 1641.

SIRUENSEE, a Danish physician, who, through Queen Matilda, directed the affairs of Denmark, in concert with Count Brandt, from 1769 to 1771. By a conspiracy of the Danish nobility, Struensee, Brandt, and the Queen were arrested, and the two former put to death, the latter being allowed to retire to Zell, till her death in 1776.

Simon **STYLITES** was an insane zealot, who, in the 12th century, passed a life of self-devotion at the top of a high column, and was imitated by Daniel and others; and this was thought so godly, that these wretches were believed to work miracles, and some of them were canonized as Saints of the Christian church.

There were two **SUETONIUSES**, one a successful and cruel general, the same who vanquished Boadicea, about

the year 60; and the other a polite writer, and biographer of the Cæsars.

Emanuel SWEDENBURG, a Swedish visionary, was born in 1688, and after writing many mystical books, and establishing the New Jerusalem Church, he died in London, in March, 1772. He pretended to hold converse with angels, and with the spirits of the most eminent characters. He abstained from the use of animal food.

Dean SWIFT, distinguished by his various writings, was born in 1667, and after mingling with political parties, and producing many works of extraordinary genius, he fell into a state of idiotcy in 1736, and died in 1745. His works make 19 volumes octavo.

SYLLA, a celebrated Roman, was born 130 B. C.; in 88 he was Consul and quarrelled with Marius, which led to a murderous civil war, in which Sylla put to death vast numbers of the highest rank and merit, and became Dictator for two years, but retiring, he died soon after.

TACITUS, the Roman historian, was born A. D. 56. His history is from Galba to Domitian inclusive. His annals extend from the death of Augustus to that of Nero, but they are now imperfect.

TALIESEN, the Welsh Bard, many of whose works are preserved in Owen's Archeology, flourished in the 6th century, and was buried at Llanfihangel.

The TARQUINS, famous in Roman history, were of commercial origin. Priscus became King of Rome, and after a long reign was killed, 570 B. C. Superbus, his grandson, succeeded 534 B. C., but his son ravishing Lucretia, in 509 B. C. he was banished, and died 14 years in exile.

Jeremy TAYLOR, the son of a barber at Cambridge, and born in 1613. He was patronised by Laud, and on the ruin of his party he fled into Wales; but, at the Restoration, was made Bishop of Down. He died at Lisbon, in 1667; many of his works are still popular.

William TELL, a Swiss peasant, who lives in the annals of patriotism. He flourished at the beginning of the 13th century, and was drowned by an inundation in 1234. His intrepidity aided his country in shaking off the dominion of Austria, but the story of the apple has been doubted, for the very same circumstances are related by Saxon Grammaticus, about 100 years before, in relation to one Tacco, a Dane. That Tell was the man who shot Gesler is n fact more certain.

There were three TENIERS, most ingenious painters of the Dutch school. The father, David, was born in 1582, and died in 1619; his son David was born in 1610, and after excelling his father in the same line, died in 1694; his brother Abraham had not equal reputation.

TERENCE, the Latin dramatist, was born in 194 B. C., and was originally a slave.

TERTULLIAN, a father of the church, flourished in the 2d century, but his writings are in little estimation.

THALES, one of the earliest Greek philosophers, flourished in the 6th century, B. C. He studied in Egypt, taught the sphericity of the earth, and calculated eclipses. He considered that water was the origin of matter, and that motion produced by mind was the first exciter; he lived to the age of 90, in distinction. Thales first collected the poems of Homer, and has by many been considered as their true author; but Konades, a modern Greek professor, maintains that they were written by Ulysses, and on visiting the site of Troy, he alleges that he traced every locality described with unerring precision, inferring that the descriptions could not have been those of a blind poet. Like all writers of Poems and Romances, Homer's localities would be correct, and his characters fictitious.

James THOMSON, author of the *Seasons*, was born at Ednam, in 1700, and removing to London in 1722, he published his *Winter* in 1726. In 1728, his *Summer* and *Spring*, and in 1730 his *Autumn*. His other works were *Sophonisba*, *Alfred*, *Tancred and Sigismunda*, a poem called the *Castle of Indolence*, and some smaller pieces. He obtained a pension of £100 per annum, and an appointment which yielded him £300 per annum, and died in 1748. His tragedy of *Coriolanus* was posthumous.

The Emperor TRAJAN was a son of a commander under Vespasian, and finally nominated by Nerva as his successor. He succeeded in 97 A. D., and, after various other wars with the Dacians and Parthians, he died in Cilicia, A. D. 117.

Van TROMP, the famous Dutch Admiral, was born at Brazil, in 1597, he fought many battles with the English Admirals Blake, Monk, and Dean, but in August, 1653, he was killed in one of them by a musket-ball. He had a son, CORNELIUS, not less famous, who served under his father, and commanded-in-chief in the war between the States and Charles II., sailing at one time down the channel, with a broom at his mast-head, attacking and burning Chatham, and even threatening London. In

1675 he visited the English court, and Charles II. made him a baronet. After other services, he died in 1691.

Marshal TURENNE was born in 1611; in 1639 he commanded in Italy; in 1645 he gained a great victory at Nordlingen; in 1674 he conquered Franche Compte, and like a barbarian devastated the Palatinate. one of the many atrocious acts of modern warfare. He defeated the Imperialists at Mulhausen and Turkeim, and, fortunately for the world, was killed at Salzbach, in 1675. The flatterers of the Bourbons call him the great Turenne.

TURNER, Bishop of Rochester, one of the seven prosecuted by James, and one of three of them, including Sancroft and Ken, who refused to take the oath of allegiance to William, and therefore deprived of their bishopricks.

TURPIN, Archbishop of Rheims for 40 years, in the reign of Charlemagne, the pretended author of the Romances of Charlemagne and Roland, but they were not written till 200 years after.

TUSSER, author of 500 good points in husbandry, died in 1580.

TYNDALE, William, an early English Translator of the New Testament, the Pentateuch, and Jonah; for publishing of which he was seized at Antwerp, and burnt at Augsburgh, in 1536.

TYRRELL, James, the author of the English History to the death of Richard II, in 5 vols., folio, died in 1718.

TYRTÆUS, the Athenian Poet flourished about 700 B. C.

There have been four literary TYTLERS, Henry William, a Physician and Poet, who died in 1808; James, who died in America, in 1805; William, a critical Historian and Poet, who died in 1792; and Alexander Frazer, Lord Woodhouselee, who died in 1813.

UBALDINO, a celebrated illuminator on vellum, flourished in England in the reign of Elizabeth.

ULLOA, Don, who, in 1735, was sent with Don Juan to measure a degree at the equator, and published an account. He died Governor of Louisiana in 1795.

ULUGH BEY, a Tartar Prince, who cultivated Astronomy at Samarcand, and was murdered in 1447.

USHER, Archbishop of Armagh, a voluminous writer, and very learned divine, was born in 1580, and died 1656.

USTARIZ, the first writer on Political Economy, published his Theory of Commerce, at Madrid, in 1742; and translations appeared in Paris and London. It was the basis of the work of Adam Smith.

There were four VAILLANTS, one Francis, the African traveller, who died in 1824; John Foi, who wrote learnedly on Numismatics, and died in 1706; Sebastian, a Botanist, who died in 1722; and Wallerant, a Painter, who died in 1690.

VALAZE, an amiable member of the French Convention, who, in 1790, visited England to study Platonism under Thomas Taylor; but, returning to France, was chosen a member of the convention, and being proscribed with the Girondists, he stabbed himself before the bloody Revolutionary Tribunal in Oct. 1793.

VALENTINE, the Alchemist, who discovered antimony, flourished in the 15th century, at Erfurt.

VALLENCY, the Irish Antiquary, was born in 1721, and died in 1812.

VALMIKI was a very early Hindoo Poet, who wrote an epic poem, called the Ramayana, of which two books have been translated.

VANBURGH, Sir John, Architect and Dramatist, died in 1726. He wrote the Relapse, Provoked Wife, Esop, Confederacy, and Provoked Husband. He built Blenheim and Castle Howard.

There were two VALDERVELDES, father and son, celebrated for seapieces. The first died in 1693, and the latter in 1707.

There were two brothers VANDERWERF, Adrian and Peter, famous for small history; one died in 1722, and the other in 1718.

VANDYCK, Sir Anthony, the Prince of Portrait Painters, was born at Antwerp, in 1599, and died in 1641.

VANE, Sir Henry, was a distinguished Patriot, born in 1612; and barbarously put to death, in 1662.

VAN-GOYEN, a Dutch Landscape Painter, died in 1656.

VANINI, a Neapolitan, who wrote in France some free works on Theology, which the clergy called Atheistical; and, to their everlasting disgrace he was burnt alive at Toulouse, in 1619.

VANINI.—He was the last victim on a charge of Atheism, "having published that God is the beginning and the end; the father of both, without need of either; eternal, without time; in no one place, yet present every where; creating all and governing all." This, however, was not the God of the Romish church; so Anaxagoras was obliged to flee for his life, for asserting that Apollo did not lead the sun in a chariot drawn by horses.

VANLOO, the Historical Painter, died in 1746. He had a brother Charles, and a son and nephew, also distinguished painters.

VARRO, a learned Roman, who died 27 B. C., aged 90. There was another Varro Atacinus, a poet of distinction.

VASARI, a painter, and author of the Lives of the Painters, died in 1574.

VATTEL, the Expounder of the Law of Nations, died, in 1767, at Neufchatel.

VAUBAN, Marshal, celebrated as an Engineer, died in 1707, aged 74.

VEGA, Lopez de la, the Spanish Poet, famous for his genius and industry, his miscellaneous works forming 22 volumes in 4to. and his dramatic, 25 vols. He died in 1635.

VELASQUEZ, the Spanish Painter in History and Portrait, died in 1660.

VERNON, Admiral, took Porto-Bello in 1739, and died in 1757.

VESPASIAN, the Emperior, died in 79. after a reign of 10 years.

VESPUCIUS, Amerigo, a Florentine Navigator, whose name was given to the new world, owing to Brazil being marked on the charts, Amerigo's Land. In 1497 he made a voyage, and discovered Terra Firma. He afterwards coasted Brazil to Patagonia, which was first called Amerigo's Land, and then America. His four voyages and letters have been published.

VIDA, a modern Latin Poet, died 1566.

VILLARS, Marshal, the antagonist of Marlborough, in 1708 and 9. He died in 1734.

VILLIERS, George, first Duke of Buckingham, third son of Sir George Villiers, born in 1582, and favourite minister of James I. and Charles I. till he was killed by John Felton, in 1628. His son, who was a reprobate favourite of the dissolute Charles II. wrote the Rehearsal, and died in 1683.

VINCI, Leonardo da, a distinguished Painter, was born in 1452, and died in 1520, in the arms of Francis the First.

VIRGIL, or Publius Virgilius Maro, the principal Roman Poet. He was born 70 B. C., near Mantua. At first he studied philosophy. At 33, he wrote his Eclogues, then his Georgics, and, at 45, his Æneid. He was patronised by Pollio, Mecænas, Augustus, and Octavia. He died 19 B. C., aged 51.

VISHNOO-SARMA, a Brahmin of a very early age, who wrote the Fables and Apologues of Pilpay, or Bidpai.

VITRUVIUS, the Architect, flourished in the time of the two first Cæsars.

VOLNEY, Count, was born in 1755. He published Travels in Syria and America, and wrote a much-read work called Ruins. He also published new Researches in Ancient History, exposing the errors of the Jewish chronology, and other works. He died in 1820.

VOLTA, the experimental Philosopher, was Professor at Pavia, and died in 1826.

VOLTAIRE, a Dramatist, Poet, and Philosopher, was born in 1694, and died in 1778. He was, for 50 years, the most popular writer in Europe. His works extend to 71 volumes octavo, and are constantly reprinted. His Philosophical Dictionary was lately published in six volumes, in London.

There were several writers of the name of **VOSSIUS**; the first and most eminent was Gerard John, born 1577, who died in 1648, and wrote ably on many subjects; and his son Isaac was born in 1618, and died 1688, after publishing many learned works.

WAKEFIELD, Gilbert, a learned Critic, and honest Political and Theological writer, born 1756, and died 1801.

WALKER, George, the Irish Divine, who defended Londonderry, in 1689, against King James. He was afterwards killed at the battle of the Boyne, 1690.

WALLACE, Sir William, the Scottish Patriot, opposed to Edward I. He was made Regent for John Baliol, but defeated at Falkirk, and being taken was barbarously put to death in London, in August, 1305.

WALLER, the Poet, was born at Coleshill, in 1605, and, having a large estate, made love to Lady Dorothea Sidney, whom he celebrated as Sacharissa. He suffered in the civil wars, and died at Beaconsfield in 1687.

WALLIS, John, a Mathematical Philosopher of great eminence, was born in 1616, and died in 1703.

WALPOLE, Sir Robert, one of Queen Anne's Ministers, and Prime-Minister to George I. and II., died Earl of Orford, in 1745, aged 69.

WALPOLE, Horace, his third son, a dilettante man of letters, was born in 1718, and died in 1797.

WALSINGHAM, Sir Francis, a statesman in the age of Elizabeth, died in 1590, aged 90.

WALTON, Isaak, a London linen-draper, who wrote a book on Angling, and some Biographies. He died in 1683.

WARBURTON, Bishop of Gloucester, a man of much temporary note, as the friend of Pope, Allen, &c. His works are chiefly professional. He died in 1779.

There were two **WARTONS**, brothers, Joseph and Thomas. The first, who died in 1800, was master of Winchester school, and Editor of Pope's Works. The second, who died in 1790, was Poet Laureate, and wrote the History of English Poetry, besides critical works.

WASHINGTON, George, commander of the American armies, and first President of the United States,—a man of the happiest union of good qualities. After a life of unsullied glory he died December, 1799, aged 68.

WATSON, Bishop of Llandaff, a Phi-

losopher and Theologian, Author of Chemical Essays. He died in 1816.

WATT, James, the improver of the Steam-engine, and inventor of many machines, died in 1819.

WATTS, Isaac, a laborious writer and pleasing Poet, born in 1674, and died in 1748.

WAINFLETE, William, Lord Chancellor and Bishop of Winchester, but memorable as founder of Magdalen College, Oxford. He died in 1486.

WEBER, Author of Der Freischutz, was born in Holstein, 1786, and died in London in 1826.

WENTWORTH, Earl of Strafford, Lord Deputy of Ireland, 1632, and subsequently adviser of Charles I., was impeached in 1640, and beheaded 1641.

WERNER, the founder of Mineralogy and Geology as modern sciences, was born 1750, and died 1817, at Freyburg.

WESLEY, John, a religious enthusiast and an excellent man, who for 60 years preached through the three kingdoms, and increased the sect of Methodists. He died in 1791, aged 88.

WEST, Benj., a celebrated Painter, and President of the Royal Academy, was born in Pennsylvania in 1738, and died in London in 1820.

WHITBREAD, Samuel, son of a wealthy porter-brewer in London, and one of the able and eloquent opposition in the House of Commons, who for 20 years united with Fox, Sheridan, Erskine, Grattan, Grey, Romilly, &c. in opposing that policy of the court of George the Third, which devastated Europe by wars against the French revolution, and exhausted the resources of Britain in the national debt, &c. He destroyed himself in a fit of temporary insanity, in 1815, aged 56.

WHISTON, William, successor of Newton as Mathematical Professor at Cambridge, but displaced for Unitarian doctrines. He died in 1752, aged 85.

WHITFIELD, George, the enthusiastic founder of Calvanistic Methodism, in the propagation of which he preached through this kingdom and United States for 30 years, dying in New England, in Sept. 1770.

WHITTINGTON, Richard, Sheriff of London, 1389; and Lord Mayor in 1397, 1406, and 1420, celebrated as a runaway scullion boy, who afterwards acquired great wealth as a Merchant.

WICKLIFF, John, the first English Reformer, died in 1384. He was protected by John of Ghent, Edward's son and Richard's uncle, yet virulently persecuted by the Church, and rescued from martyrdom only by a paralytic attack, in his 60th year.

WIELAND, C. M., the Voltaire of Germany, whose works, in prose and verse, make 42 vols. 4to. He died in 1813, in his 80th year, near Zurich. In 1808, Napoleon considered it an honour to breakfast with him.

WILKES, John, was an English demagogue, before and during the American war, who outlived his professed principles, and died Chamberlain of London in 1797, aged 70.

WILLIAM THE FIRST, King of England, who, two centuries after, was called the Conqueror, was natural son of Robert, sovereign Duke of Normandy, by Arlotta, daughter of a tanner of Falaise. He was born in 1024, and in 1035 was adopted as heir to the dukedom. In 1065, Edward, the doting Confessor, bequeathed him the crown of England, in prejudice of his nephews, Tosti and Harold; and William landing with an immense army, defeated and killed Harold at Hastings, Oct. 4, 1066. He then treated the nation as a conquered country, seized on all the lands, &c. and distributed them among his rapacious followers, who asserted their claims with fire and sword, and entrenched themselves in castles throughout the kingdom. After a troublesome and tyrannical reign, he was killed in a murderous affray by a fall from his horse, near Rouen, in 1087.

WILLIAM THE THIRD was Stadholder of Holland, and son of Mary, daughter of Charles I., therefore nephew of James II., whom he expelled in 1688. He also married Mary, the daughter of James, in 1678. On July 1, 1690, he defeated James at the battle of the Boyne; and his admiral, Russell, destroyed the fleet of James's ally, Louis IV. In 1692, at La Hogue. The war was terminated by the treaty of Ryswick, in 1696. But, in 1701, the King of Spain having bequeathed his crown to the grandson of Louis XIV. William stirred up a confederacy against France, but, before it was in action, he was killed by the fall of his horse in Bushey-park, and died March 6, 1702.

WILLIAM of NASSAU, founder of the Dutch Republic, opposed the Spanish Viceroy, Alva; and, in 1579, procured a recognition of the independence of the Seven Provinces. He was killed by a Spanish emissary in 1584. He was succeeded as Stadholder by his second son, Maurice.

WILSON, Richard, the English Claude, was born in Montgomeryshire, in 1714; and, after a life of destitution, died in 1782.

WINCKELMANN, the celebrated Antiquary, was a shoemaker, born in Brandenburgh, in 1718; and was murdered in an inn at Trieste, for the sake of some gold medals, in 1768.

WISHART, George, was a Scottish gentleman, and man of learning, who, being tried at Edinburgh for heresy, was burnt alive March 1, 1546.

WITTIKIND was the Pagan Chief of the Saxons, against whom the bigot, Charlemagne, made war, and overcoming he caused him to be baptized. He was killed in 807.

WOLCOT, John, better known by his literary name of Peter Pindar. He was born in Devonshire, in 1738; and, in 1767, went to Jamaica, as physician, with Sir W. Trelawny. He then settled at Truro and Fowey, and finding a boy (Hoppe) at work in a saw-pit, who evinced great talents in painting, he came with him to London, and changed his name to Opie. In favour of his pupil, he wrote Odes to the Academy; but the king withholding his patronage he wrote *the Louisiad*, and a series of satirical poems, which enjoyed such unparalleled popularity, that some booksellers settled 250*l*. a year upon him for the copyrights, after 50,000 had been sold. He died in 1819.

WOLFE, General, the conqueror of Canada, was killed before Quebec in 1759, in his 34th year.

There have been six German writers of the name of WOLFIUS, properly Wolff. The chief of them was Christian, the mathematician, born 1679, and died 1754.

WOLSEY, Thomas, Cardinal, Lord Chancellor, Archbishop of York, &c. &c. &c. was a butcher's son at Ipswich, and born in 1471. For 20 years, from 1509 to 1529, he was minister and master of Henry VIII.; but offending him about Anne Boleyn, he was disgraced, and being arrested for high-treason, he took poison at Sheffield castle, and died at Leicester abbey, in Nov. 1530.

WOLLASTON, Dr. Thomas, a very active and acute experimentalist, contemporary with Davy and Young, inventor of the scale of Equivalents, and author of many able papers in the transactions of the Royal Society. He died aged 65, in 1829.

WOOLASTON, William, author of the Religion of Nature Delineated, died in 1724.

WOOLSTON, Thomas, author of an Exposition of the Miracles, for which he was fined and imprisoned, died 1732.

WREN, Sir Christopher, the builder of St. Paul's, &c. &c. was born in 1632, and died in 1723.

WOODVILLE, Anthony, Earl Rivers, was brother of Elizabeth Grey, whom Edward IV. married, and a distinguished patron of letters, and the art of printing. To assure the coronation of his nephew, Edward V., he had prepared some forces; but being defeated, he and others were, without trial, beheaded at Pontefract, by order of Richard Duke of Gloucester.

WYKEHAM, William de, Bishop of Winchester, and Chancellor in 1367, is memorable as the founder of New College, Oxford, and of Winchester School. He died in 1404.

XENOCRATES, a pupil of Plato, and 25 years teacher in his school. He died in 314 B. C., aged 81.

XENOPHON, a Greek commander, who conducted the retreat of the ten thousand, and wrote many works, died nearly 100, in 360 B. C.

YOUNG, Arthur, a very useful and extensive writer on Agricultural Science, which his labours greatly improved. He died blind in 1820, aged 79.

YOUNG, Edward, D. D., author of Night Thoughts, and three Tragedies, died at Welwyn, in 1765, aged 84.

YOUNG, Dr. Thomas, one of the ablest mathematicians and experimental philosophers of the early part of this century. He developed new and perfect views of light, produced a reasonable theory of Egyptian Hieroglyphics, and wrote several able works. He died aged 59, in 1829.

ZENO, a mystical Greek Philosopher, who flourished at Elia, about 400 B. C.; and there was a later ZENO, a native of Cyprus, and first teacher, at Athens, of stoical or self-denying principles.

ZENOBIA, Queen of Palmyra, and wife of Odenatus, at whose death, in 267, she declared herself Queen of the East; but Aurelian took Palmyra, and reduced her to a private station.

ZEUXIS, a celebrated Greek painter, in the fourth century B. C.

ZINGIS-KHAN, or Jenghis-Khan, was born in Tartary, about 1160; about 1200 he was acknowledged chief of the Mogul tribes, for whom he wrote a legal and moral code divested of religion, of which he tolerated all sects. In 1210 he invaded China, and conquered five provinces. He then defeated the Sultan of Karizm, seized his dominions, and became master of all central Asia, including Georgia, and the countries around the Caspian. He died in 1227, during a third expedition to China. His posterity still constitute the royal houses in several countries.

ZINZENDORF, Count, the patron of a sect of Moravian Co-operatives, who lived together, in common, at Hernhutt, in Lusatia. He died in 1760.

ZOROASTER, a celebrated Chaldean Astronomer and Astrologer, and the founder of the Religion of the Magi, who worshipped fire and the sun as emblems of the Deity, and now exist under the name of Parsees.

THE END.

A

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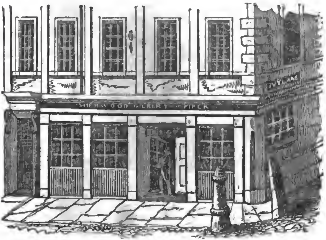

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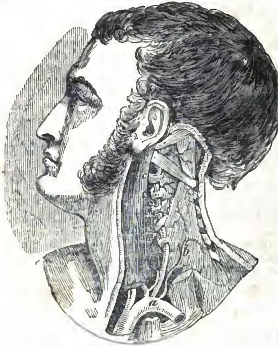

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